



REPUBLIC OF SERBIA
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Republic of Serbia
MINISTRY OF HEALTH

UNIVERSITY CLINICAL CENTRE OF SERBIA



UCCS



Abstract Book

The First World Conference
Fighting COVID-19 Pandemic
Health Challenges

**COLLECTIVE KNOWLEDGE.
GLOBAL HEALTH.**

26-28 March 2022, Belgrade, Serbia



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The First World Conference
Fighting COVID-19 Pandemic - Health Challenges

COLLECTIVE KNOWLEDGE.
GLOBAL HEALTH.

Welcome to Serbia Welcome to Belgrade





MINISTER OF HEALTH OF THE
REPUBLIC OF SERBIA
Zlatibor Lončar, MD, PhD



CONFERENCE CHAIRLADY
Tatjana Adžić-Vukičević, MD, PhD

Dear Colleagues,

For the past two years, challenges posed by the pandemic have radically changed our everyday lives, habits, and the worldwide communication as well. Health systems around the world faced serious problems in the past, on a scale never seen before.

Owing to the joint efforts of experts, health workers, government agencies and timely mobilization of the public to adhere to the prevention measures and immunization against COVID-19, health systems have shown resilience and strength to face the challenges in crisis, while relying on a specific model of each and every country.

Recognizing the importance of this imperative, as well as the challenges that in the future, may arise in relation thereto, the Government of the Republic of Serbia, the Ministry of Health and the COVID Hospital Batajnica, part of the University Clinical Center of Serbia, have organized The First World Conference "Fighting a COVID-19 Pandemic – Health Challenges" – Collective Knowledge – Global Health in Belgrade, Republic of Serbia, to be held on March 26-28, 2022.

Hoping that COVID 19 will eventually come to an end and in the light of the fact that the virus soon will become an endemic, a flu-like disease, The First World Conference "Fighting

a COVID-19 Pandemic – Health Challenges” represents a comprehensive scientific debate, effective cooperation among stakeholders and experts, knowledge sharing, but will also convey sincere messages of encouragement, optimism and willingness to improve health achievements and leave no one behind.

This occasion shall also allow us to gratefully acknowledge the scientific contribution of all authors.

In the light of these efforts and the common goal: Collective Knowledge – Global Health, we believe that this Abstract Book will provide a platform for further improvement of professional knowledge and be a comprehensive source in the field of medical science.

With thanks and appreciation,
Sincerely,

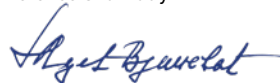


Minister of Health
of the Republic of Serbia



Zlatibor Lončar, MD, PhD

Conference Chairlady



Tatjana Adžić-Vukičević, MD, PhD



1 Challenges the health systems are faced with during the pandemic

Invited speakers

Oral presentations

E poster

Abstracts are ordered by arrival date

The First World Conference
Fighting COVID-19 Pandemic - Health Challenges

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Work of the Polyclinic of the University Clinical Center of Serbia During the Pandemic of COVID 19

Snezana Polovina¹

Background: At the beginning of the COVID 19 pandemic, the Polyclinic distributed the nurses from administrative counters to triage, at the entrances to the building. Polyclinic worked for emergencies, and daily hospitals for endoscopic procedures, interventional radiology, transfusions for chronic patients, chemotherapy, immunological and biological therapy. In April 2020, a temporary hemodialysis department was formed in the Polyclinic, with 23 dialysis places in three shifts.

Methods: The overview of organization of the Polyclinic of the University Clinical Center of Serbia during the pandemic of COVID 19.

Results: From May 2020, the regular work of the outpatient clinic in the Polyclinic started again, but 20-25% of nurses from Polyclinic have been moved to work in COVID hospitals, Emergency center, Epidemiology and Transfusion department. Since December 2020, 15% of nurses from the Polyclinic have been assigned at COVID Hospital Batajnica and in the call center, in which 4 more nurses are engaged all 7 days a week. At the beginning of 2021, vaccinations against COVID were organized in the Polyclinic, which was performed in parallel with regular work, and vaccination was performed by 8 nurses in each shift. About 5500 people were vaccinated, while other nurses took over their work at the counters and triage. In April 2021, due to the reconstruction of the building where the Polyclinic is located, all services are moved to the other facilities within the UCCS, to 22 adapted spaces on the different clinics, where 60% nurses worked on counters, and 30% were still in COVID hospital and other workplaces. During the pandemic, only at one counter was the transfer of COVIDs from one nurse to another.

¹ Center for Outpatient Clinics-Polyclinic, University Clinical Center of Serbia, Belgrade, Serbia

The Impact of COVID-19 Pandemic on Care and Practice at Clinic for Orthopedics Surgery and Traumatology - Back to "New Normality" -

Marko Kadija^{1,2}, Darko Milovanović^{1,2}, Stefan Korica¹,
Ivana Glišović -Jovanović¹, Petar Vukman¹, Svetlana Srećković^{1,2}

Background: The COVID-19 pandemic, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has undoubtedly affected all national healthcare systems at different levels. The Clinic for Orthopedic Surgery and Traumatology, University Clinical Center of Serbia, also adapting to the new situation, with large and rapid changes whilst maintaining treatment for orthopedics patients.

Material and methods: This retrospective study conducted between 2019 and March 2022 included all orthopedic patients treated during this period at the Clinic for Orthopedic Surgery and Traumatology.

Results: During the Covid-19 pandemic, the number of outpatient visits was significantly decreased, by 45% in 2020 and 64% in 2021. compared to 2019. The number of inpatients through this period was significantly lower, but the total number of emergency admissions was doubled ($x_2 = 851.099$; $p < 0.001$). The number of operated patients decreased during 2020 by 49%, and 46% in 2021, compared to 2019. The waiting lists have grown significantly for hip and knee arthroplasty during the pandemic ($x_2 = 23.285$; $p < 0.001$). The increasing financial burden for orthopedics trauma patients continued to rise reaching the highest level in 2021.

Conclusion: Dealing with the increase in the number of orthopedic trauma patients and the rise on waiting lists for arthroplasty procedures during the Covid-19 pandemic will be challenging for the institution to go back to "new normality".

1 Clinic for Orthopedic Surgery and Traumatology University Clinical Center of Serbia

2 University of Belgrade, Faculty of Medicine

Organizational Healthcare Aspects of Vascular Surgery During the COVID-19 Pandemic

Franco Grego¹

Background: The Vascular Surgery Division of the Padova University Hospital is a Hub center located in Veneto, one of the areas of Northern Italy most hit by the Coronavirus disease 2019 outbreak. The aim of this paper is to describe the impact of Coronavirus pandemic on the management of elective and urgent/emergent surgery, outpatients, Hub/Spoke organization, costs, and health staff infection with Sars-Cov2.

Methods: Several measures were progressively adopted in the Padova University Hospital to front the Coronavirus disease 2019 outbreak, with a clear strong asset established by 9 March 2020, after the Northern Italy lockdown. Since this date, the Vascular Surgery Unit started a “scaled-down” activity, both for elective surgical procedures and for the outpatient Clinical activities; different protocols were developed for health preservation of staff and patients. In particular, emergent vascular surgery was regularly guaranteed as well as urgent. Elective cases were scheduled for “non-deferrable” pathology. A swab test protocol for COVID-19 was applied to health-care professionals and hospitalized patients.

Results: The number of urgent or emergent aortic cases remained stable, while the number of Hospital admissions via Emergency Room related to critical limb ischemia decreased after national lockdown by about 20%. Elective vascular surgery was scaled down by 50% starting from 9 March; 35% of scheduled elective cases refused hospitalization during the lockdown period and 20% of those contacted for hospitalization were postponed due to fever, respiratory symptoms, or close contacts with Coronavirus disease 2019 suspected cases. Elective surgery reduction did not negatively influence overall carotid or aortic outcomes, while we reported a higher major limb amputation rate for critical limb ischemia (about 10%, compared to 4% for the standard practice period). Other healthcare organizational problems included deferral of surgeries due to unavailability of Intensive Care Units, increased waiting time before surgery, increased referral to Hub centers due to conversion of spoke

¹ University of Padua, Department of Cardiac, Thoracic, Vascular Sciences and Public Health, Division of Vascular and Endovascular Surgery

centers to COVID hospitals, infection of healthcare workers. Among 22 vascular doctors, 9 had a confirmed Coronavirus disease 2019 infection since the beginning of the pandemic.

Conclusions: Elective vascular surgery needs to be guaranteed as possible during Coronavirus disease 2019. The number of truly emergent cases did not reduce, on the other side, Emergency Room accesses for non-emergent cases decreased. A hub/spoke healthcare organization system should be designed during the COVID-19 pandemic to guarantee optimal outcomes to vascular patients.

Pandemic as a Challenge to Healthcare Systems: Mental Health During COVID-19 Crisis

Ivana Stašević Karličić^{1,2}

Background: As the COVID-19 pandemic rapidly sweeps across the world, it is inducing a considerable degree of problems with mental health in the general population and among certain groups in particular, such as people with underlying health conditions, older adults, care providers, etc. This study presents some specific activities that the Clinic for Mental Disorders „Dr Laza Lazarević“ in Belgrade, Serbia has carried out during the COVID-19 pandemic, with support of the Ministry of Health Republic of Serbia.

Methods: The study was realized as a descriptive, case-report study, and the observation unit was Clinic for Mental Disorders “Dr Laza Lazarević”. Data collection were separated in 6 domains, as follow: reorganization of Clinic, developing telemedicine services in domain of mental health, COVID-19 immunization, support for health (co)workers in other health institution, work of center for mental health, and public-health activities focused on preservation and promotion of mental health.

Results: The priorities of the Clinic during the COVID-19 pandemic were focused on the quality of work and safety of employees, improving the health of health (co)workers in other health institutions, people with mental disorders, as well as their families and all citizens of the Republic of Serbia who had mental problems.

Conclusion: Mental health is an integral and essential component of health. The ability of individuals to be adapted to the new circumstances, as well as their maturity, represents the most valuable resources of a society.

1 Clinic for Mental Disorders „Dr Laza Lazarević“ Belgrade, Serbia

2 Faculty of Medicine, University of Priština - temporarily settled in Kosovska Mitrovica, Kosovska Mitrovica, Serbia

Neurosurgery and CoronaVirus: Influences and Challenges in the Treatment of Emergency and Elective Patients at the UCCS Neurosurgical Clinic

Miloš Joković^{1,2}, Rosanda Ilić^{1,2}

Introduction: The pandemic caused by the COVID-19 virus has caused global changes in health systems all over the world and also in Serbia, not only when it comes to treating COVID-19 itself, but also when it comes to organizing the treatment of patients with other diseases. Surgical clinics were hit the hardest, both because of the delicacy and urgency of patients who require surgical treatment, and because of the redistribution of staff who participate in the work of these institutions, in the first place anesthesiologists.

Results: Since the beginning of the pandemic, the Neurosurgery Clinic has functioned as a "NON- COVID" hospital, which meant that within our clinic only patients with negative COVID testing were treated. The Emergency Center is excluded from this rule, where patients are operated according to the level of urgency.

One of the biggest challenges was the selection of patients according to the degree of urgency, especially at the time of "lock down", when only emergency patients were operated on. In neurosurgical patients, this included life-threatening conditions within a few hours, as well as life-threatening conditions and patients with endangered neurological functions over a period of several days. The largest number of patients operated on in this period were patients with intracranial bleeding and brain tumors. In addition, the organization of work was hampered by the referral of patients from other neurosurgical clinics, which were out of function due to the redistribution of capacity, as well as patients from the Republic of Srpska and Montenegro. In addition to adults, more than 150 pediatric patients were operated on annually.

After this period, patients with strictly selected pathology were operated on. The problem with the lack of staff has been solved by redistributing work to the afternoon and weekend.

1 School of Medicine, Belgrade University

2 Neurosurgical Clinic of the UCCS

In total, during 2021 in the Clinic for Neurosurgery 2361 patients were operated on, in 2020, 1964 patients, with the lowest number of operations in April 2020, when 54 operations were performed.

In addition to the operations during the COVID 19 pandemic, two devices for stereotactic radiosurgery worked without interruption, the Gamma Knife Center, where in 2020, 603 patients were treated and in 2021, 573 patients. In X-Knife Center, another radiosurgery device, from March 2020 to the end of 2020, 793 patients were treated, and during 2021, 1480 patients. The Daily Hospital also worked without interruption, where more than 200 patients received chemotherapy per year, and the angiography suite, where more than 300 endovascular interventions were performed per year.

During 2021, the operating theater at the COVID hospital in Batajnica was equipped, where 13 operations have been performed so far.

Despite pre-hospital testing, COVID infection occurred sporadically in hospitalized patients, including 4 epidemics. The treatment of these patients continued in COVID specialized institutions, and the further spread of the infection was stopped. In operated patients, COVID infection negatively affected postoperative recovery and treatment outcome, except in previously vaccinated patients.

Conclusion: During the COVID 19 pandemic, the Neurosurgery Clinic operated as a NON-COVID hospital. Emergency operations were performed regardless of the COVID status of patients (positive ones in the Emergency Center and COVID Hospital Batajnica), while elective procedures were performed on a smaller scale and after assessing the degree of urgency, due to lack of anesthesiologists, in the first place. In addition to operations, radiation and chemotherapy of patients with brain tumors and the endovascular program were continued. Despite respecting epidemiological measures, infection occurred in some patients, and the basic form of preventing a poor outcome in operated patients with COVID infection is vaccination.

Use of Telemedicine Technologies for Chronic Limb Threatening Ischemia Referral During COVID-19 Outbreak.

Toledo-Rubio María-Isabel¹, Ibáñez-Rodríguez José-Francisco²

Background: During the COVID 19 outbreak in Mexico, the health system underwent unprecedented changes. In order to provide care to COVID-19 disease, non emergent pathologies were deferred including CLTI. WhatsApp is a low-cost telemedicine tool able to share text and clinical images instantly, streamlining the referral of CLTI patients to a third-level care unit.

Objective: Report the results of Whatsapp use for the referral of patients with CLTI during COVID-19 outbreak.

Methods: Retrospective, cross-sectional observational study. All patients presented in a WhatsApp group with clinical diagnosis CLTI during the April to September 2020 period were included. Patients accepted, time elapsed for face-to-face assessment, type of revascularization and limb salvage rates were analyzed using descriptive statistics.

Results: 208 patients were presented, 72.1% (n = 150) by first-level care units. The average time to face-to-face assessment was 1 day. Of the 208 requests submitted, 82.7% (n = 172) were accepted. Diagnostic arteriography was performed in 140 patients and 74.3% (n = 104) underwent revascularization of the affected limb, with a limb salvage rate at 6 months of 80.8% (n = 113).

Conclusions: Although the COVID-19 pandemic has dramatically changed the practice of vascular surgery, the use of Whatsapp as a low cost telemedicine tool has made it possible to continue with the treatment of patients with CLTI.

1, 2 Vascular surgery department UMAE Hospital de Cardiología, Monterrey, México.

Challenges and Experiences During the COVID-19 Pandemic at Batajnica Hospital

Biljana Jokić¹

The occurrence of a novel coronavirus disease (COVID-19) in the city of Wuhan, the People's Republic of China, and a rapid increase in the number of new cases brought about spreading the epidemic from this epicenter to the surrounding countries as well. The World Health Organization (WHO) declared a global health emergency on 30 January 2020.

Dealing with such pandemics, i.e. providing adequate medical treatment, care and diagnostic capacities has been enabled by the construction of the COVID hospital in Batajnica. Even though it was built in only 4 months, this contemporary hospital has become the foundation for functioning of the entire healthcare system in Serbia in the treatment of patients with confirmed COVID-19.

Competence, experience, knowledge of the medical staff and and contemporary diagnostic equipment have enabled performing various operative procedures in patients with COVID-19. The first patient was admitted to the COVID hospital on 4 December 2020. The capacity of 937 hospital beds and the largest number of hospitalized patients (around 20,000) make the COVID hospital in Batajnica the largest COVID hospital in the world.

¹ Covid hospital Batajnica, University clinical center of Serbia, Clinic for pulmonary diseases, University clinical center of Serbia

COVID-19 and Oncology – Experiences of the Institute for Oncology and Radiology of Serbia

Ana Jovicevic¹, Danica Grujicic^{2,3}, Dragana Jovicevic¹

Background: Institute for Oncology and Radiology of Serbia (IORS) is the largest comprehensive cancer center in Serbia with 12000 cancer patients treated every year, a teaching and a research center. In the pandemic, the main challenge was to continue to provide timely and quality cancer services while protecting patients and personnel from COVID-19.

Methods: In order to establish the impact of the pandemic on cancer care, we presented IPC measures and organizational changes and analyzed data on patients, healthcare professionals and services at IORS.

Results: Since the beginning of the pandemic, IORS was working without interruption, providing cancer care to a larger number of patients - cancer patients from hospitals in Serbia that became Covid centers were redirected to IORS. IORS introduced IPC measures, organized 24/7 epidemiological consultations, reorganized and set priorities for cancer care and developed new protocols; main challenges were old buildings, severe lack of space compared to needs and wards with common sanitary areas. In 2021, compared to 2019, the number of treatment episodes increased, particularly at daily hospitals (50%). We observed the increase in stage at diagnosis (breast cancer stage IV from 6 to 10%). Due to reorganization and additional efforts of all personnel, waiting time remained adequate but some patients had treatment delays or disruptions (350 patients) due to infection. About 550 employees had COVID-19.

Conclusions: Pandemic affected cancer patients and cancer services in many ways. All the measures implemented allowed IORS to continue to provide quality cancer care, but the long-term consequences are yet to be seen.

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2 Institute for Oncology and Radiology of Serbia, Belgrade, Serbia

3 University of Belgrade, Faculty of Medicine, Belgrade, Serbia

Temporary Military COVID Hospital Karaburma - Challenges, Experiences and Results

Ivo Udovičić¹, Almina Hasanović², Ana Popadić³, Aleksandar Vranjanac⁴, Đorđe Taušan⁵, Vesna Begović⁶

Background: Temporary military COVID hospital Karaburma became fully operational on April 6, 2020, with the principal mission to treat COVID-19 patients. It was founded in the Military Medical Center complex Karaburma, which was previously used for enlistment into military service and later provided specialist-level medical services for military personnel. Hospital has a capacity of 145 beds, out of which 18 plus are ICU beds. Aim of this presentation is to demonstrate numerous challenges that we encountered during the establishment of this hospital and daily work, bearing in mind limited time for adaptation and equipment as well as necessity to comply with the epidemiological measures in order to prevent spreading this highly contagious disease to medical personnel. We focused on the main issues in accomplishing our goal. Greatest challenge was to form teams and organize work in very specific circumstances. Bearing in mind that Military Medical Center Karaburma was not a hospital per se, all necessary logistical and computer-based informational support had to be organized simultaneously with admission of our first patients.

Results: During a period of nearly two years (April 6, 2020 – February 20, 2022) 4086 patients were treated. Of that number, 453 (11.1%) were ICU patients. Demographic data demonstrated an average age of 60.2 years; there were 1578 (38.8%) females and 2490 (61.2%) males; 67.1% (2731) of the patient population had one or more comorbidities. Overall hospital mortality was 8.95% (364 non-survivors).

Conclusion: Experience that we gained working in these circumstances is of immeasurable value, therefore we want to present and preserve it.

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4 The Obstetrics and Gynecology Clinic Narodni Front, Belgrade, Serbia

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6 Clinic for Infectious and Tropical Diseases, Faculty of Medicine of the Military Medical Academy, University of Defense, Belgrade, Serbia

The Effect of COVID-19 Pandemic on the Work of Clinic of Thoracic Surgery University Clinical Centre of Serbia

Ercegovac Maja^{1,2}, Bašcarević Slaviša^{1,2}, Moromila Đorđević Marina¹

Background: The COVID-19 pandemic had a massive impact on routine hospital services around the world. Hospitals and medical staff were overwhelmed with an enormous influx of COVID 19 patients, requiring fast, substantial changes to medical facilities, resource reassignment and personnel redeployment.

Methods: We compared the years 2019. and 2021. with a review of elective and emergency hospital admissions and performed surgical procedures in the Clinic of thoracic surgery University Clinical Center of Serbia.

Results: Since the beginning of the pandemic clinic has participated in treatment of patients during several months in COVID system, but has also reassigned surgeons, anaesthesiologists and nurses in other COVID hospitals. Period until admission in hospital was extended from 8,4 days in 2019. to 19,9 days in 2021., but the preoperative hospital stay was significantly shortened – from 7,8 to 4,3 days. Considering reassignment and sick leaves due to COVID 19 and slower admission rate to minimise potential intrahospital transmission, surgical procedures in 2021 were performed at 75% rate compared to 2019., same as diagnostic procedures (76%). Both online and telephone options for consultation with a surgeon, follow ups and planning were provided. Number of admissions was reduced in 2021 by 16%.

Conclusion: Cancer patients triage, adequate admission rate and reduced hospital stay were some modifications to new conditions. Multiple factors affected the surgical program; the biggest was seen in lack of anaesthesiologists and technicians due to their relocation to COVID system and the decreased number of blood donations. But even in pandemic, adequate cancer treatment and emergency thoracic interventions must be performed.

Key words: COVID 19, thoracic surgery, elective, emergency, admissions

1 Clinic of Thoracic surgery, University Clinical Center of Serbia

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Public Health Partnership and Cooperation in Fight Against COVID-19

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Background: During the COVID-19 pandemic, differences in access and availability of healthcare among countries significantly contributed to effective outbreak response. The objective was to describe coordination and organization efforts made to respond effectively to the outbreak.

Methods: Overview of the applied coordination and organizational solutions within the COVID-19 response during the 2020 and 2021 in the Republic of Serbia.

Results: The Government of the Republic of Serbia established Headquarter (HQ) for COVID-19 control consisted of 28 members, representatives of different ministries and key healthcare institutions. It has been led by the Prime Minister and Minister of Health. HQ represented evidence based decision-making authority. Also, to timely detect and treat COVID-19 cases, health system capacities were reorganized in terms of establishing of COVID-19 ambulances in each Health Care Center across the country. With support of the veterinary sector, five veterinary laboratories have put their capacities at disposal for performing RT-PCR for SARS-CoV-2 on the human samples. Additionally, two newly built and equipped laboratories for testing on SARS-CoV-2 were established with support of the government. Also, in 2021, two COVID-19 hospitals with nearly 1430 beds are newly opened for treatment of SARS-CoV-2 positive cases.

Conclusions: Beside the efforts of the healthcare system, effective pandemic response requires sustained, coordinated, complementary efforts and active involvement of other key bodies in the country. Although the COVID-19 outbreak is primarily a health crisis, joint coordinated work led by the public authorities of all structures of society is necessary to combat the epidemic.

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The Role and Importance of Caregivers of Elderly in Covid-19 Pandemic

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Introduction: Covid-19 epidemic has a negative impact on family caregivers, whether the care receivers lived with caregivers, lived separately or lived in the homes for elderly. Old people are especially vulnerable on Covid infection. The aim of this study is to understand what family caregivers could have done to support the elderly and what supports them.

Methods: We reviewed 28 Covid-19 patients treated in CHC "Zvezdara" in October/November 2021. Family caregivers were asked to describe what could have been done to support them during the COVID-19 pandemic and to suggest support they need in the future as the pandemic wanes. Thorne's interpretive qualitative methodology was employed to examine current caregiver concerns.

Results: There were 36% females and 64% males. They were 69 to 92 years old. Laboratory analyses were done, all patients had specific changes in blood test - high neutrophils (73-94) and low lymphocytes (1,2 -17,3). Inflammatory parameters were high: CRP (6- 287), neutrophils 73-94%, ferritin (301-1288-4312). D dimer was 0,34 to 24,6 (high value). All patients were tested: PCR, antigen test, serological examination. 13 patients were not vaccinated and for 11, there were no records about vaccination for other patients. Patients were RTg and CT examined. All of them had bilateral pneumonia with ground glass and nodular changes. CT diagnostic was spread with 15-17/25 score. Time from onset of symptoms to admission to hospital was 2 to 15 days. Duration of hospitalisation was 3 to 47 days. 28% of patients were febrile at the beginning of hospital treatment, 18% had one episode of high temperature during treatment, 54 % were non febrile. All patients were treated with oxygen therapy, dose was 2l to 30 l/min. Comorbidities were: hypertension in 57%, heart failure 29%, atrial fibrillation 18%, pacemaker in 3,6%. Pleural effusion was diagnosed in 29% patients, diabetes mellitus in 29%, renal insufficiency in 11%, obstructive lung disease in 11%, embolia pulmonum in 14%, gastroesophageal reflux disease on 4%, Malory -Weiss syndrome and diarrhoea by Clostridium difficile in 3,6%. 14% of patients had different tumours. A total of 26 caregivers took part in the qualitative part of research. The caregiving

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took place in three different situations: care receiver lived with caregiver (n=9), the caregiver lived separately (n=7), care receiver lived in the home for elderly. Two family caregivers cared for more than one person. Care receiver included a mother or father (n=12), husband or wife (n=6), brother or sister (n=2), grandparent (n=4), aunts/uncles (n=2), two care receivers were cared by educated person (home for elderly, geronto-domestic services).

The conversation about family caregivers' greatest concerns led to a discussion about what might have been done differently to support family caregivers to maintain their own wellbeing. There were three main themes: 1) an under-resourced continuing care system; 2) delayed pandemic plan development and 3) gaps in health and community systems made caregiving more difficult. Family caregivers want their roles to be recognized and they cite the need for improvements in communication and navigation.

Conclusion: It is necessary to show greater importance to caregivers and to understand their important role within the society, especially in pandemic conditions. The growth in demand for family caregivers and their contributions to the healthcare system will help their role to be recognized in funding and practice.

Key words: elderly, caregivers, Covid 19.

Organization of the Work of the Clinic for Neurosurgery UKC Niš During the COVID Pandemic

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Background: The Covid virus epidemic has led to major changes in people's lives, the organization of work, a great pressure on work and the functioning of the health-care system. The aim was to show that good organization of the existing space, the engagement and effort of health and non-medical staff, the commitment and in the first-place humanity, can enable uninterrupted work and provide assistance to those who needed it at that time.

Methods: The period of work of the Clinic for Neurosurgery from March 15, 2020 to January 1, 2022 was monitored. During that period, the stationary part of the Clinic was relocated 4 times outside its premises.

Results: In the mentioned period, a total of 2133 patients were hospitalized at the Clinic for Neurosurgery of the University Medical Center Nis. Out of that, surgical treatment was applied to 1336 patients.

Conclusion: The strict application of epidemiological principles, a constant cooperation and joint work of all medical structures can overcome all the problems and enable the smooth performance of core activities.

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The Challenge of Organizing the Work of Semi/Intensive Care in Newly Formed COVID Hospital Krusevac

Predrag Kovacevic¹

Background: All health care institutions have to organize the care in their responsibility. Covid Hospital Kruševac has 500 beds. All aspects of the organization were burdened by a large number of patients.

Methods: The organization in semi-intensive care in the domain of responsibility of the author, as part of a team with: coordinator, epidemiologist and head nurse is presented. The organization of work is based on human resources management. The goal of the work of the leading team of experts is the technical organization, professional management and education of all employees.

Results: The main priorities are the schedule of working hours in the “red zone” for doctors, nurses and other staff. The doctors are continuously present in the „red“ ward (8 hours during shift for doctors, and 6 hours at 12 hours shift for others). Decision of the patient’s treatment was taken over by the heads of teams (infectologista or pulmonologists). Visits are performed twice a day obtaining an individual approach to treatment, respecting Covid protocol. All data were updated for patients. The consultative examination was performed regularly. (anesthesiologist, surgeon, psychiatrist, neurologist). The education of doctors and other staff members was done continuously with practical skills and refreshing theoretical knowledge. Epidemiological control of occupational safety and regular Covid testing are part of the protocol.

Conclusion: The organization of the work was performed according to available data from the literature. I would like to thank all the health workers who participated in the work of the Covid Hospital in Kruševac.

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Impact of COVID-19 on Breastfeeding Promotion and Support Practices on Maternity Wards in Serbia

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Background: The COVID-19 pandemic has posed several challenges to the provision of newborn nutrition and care interventions including maternal support, breastfeeding and family participatory care. Despite the national guideline protecting breastfeeding practices, there are many concerns about protecting infants from their infected mothers. This study aimed to analyze how the Serbian hospitals and maternity services promote and support mothers suspected or diagnosed with COVID-19 and to identify the main barriers to the breastfeeding support practices and how to remove barriers.

Methods: A survey was conducted in September 2020 in 52 maternity wards in Serbia. The questionnaire contained four general and 15 questions about the implementation of breastfeeding support practices.

Results: The application of skin-to-skin contact and breastfeeding in the first hour was reduced during the epidemic from 59 to 35%. Breastfeeding in the first hour was not applied to 30% of healthy mothers. One third of maternity hospitals (35%) did not encourage and support the Covid-19 positive mother to milk and feed the newborn. Formula was used more often in half of the maternity hospitals. 60% of COVID-19 positive mothers were separated from children. Main barriers were lack of adequate accommodation for isolation, problems with central air conditioning, lack of staff for additional care and unsafe space for storage of mother's milk.

Conclusions: In Serbia, hospitals have not followed recommendations to protect, promote, and support breastfeeding during the COVID-19 outbreak. The disagreement between international guidelines has been a major issue. The absence of recommendations on breastfeeding support during the pandemic led to difficulties in developing standards among hospitals in different regions of Serbia.

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Teamwork - Partnership in Prevention, Diagnosis and Healthcare of COVID-19

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Background: New SARS-Cov-2 virus caused an ongoing pandemic. Experience has shown that good results are reached only by multidisciplinary approach and teamwork, which have become gold standard in prevention, diagnostics and healthcare of patients infected by Covid.

Methods: Literature review and analysis of previous research on contribution of teamwork in corona disease control.

Results: Covid team had quite significance and numerous specifics in care of COVID-19 patients. Mandatory members of the team were medical doctors of various specialties, nurses, and if necessary, other health workers and associates, which were included due to psychological, social, rehabilitative and other needs of patients. The team was led by covid coordinator. The specificity of the covid team was the necessity of constant assessment of patient's condition, due to drastic change from minute to minute. So, it is said that a patient with covid infection is the 'conductor' of the team. The fight against systemic complications was the team's imperative. Studies have shown that the progression of the disease was mostly accompanied by respiratory problems. The role of nurses in the team was extremely important in recognizing patient's problems, planning and implementing healthcare. A holistic approach to patient care yielded good results.

Conclusion: Research has shown that only multidisciplinary approaches, including health care, give the best results in the care of patients infected by covid, and it is rightly considered the gold standard.

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Providing Health Education Services in Primary Health Care Institutions Before and After the COVID-19 Pandemic

Katarina Boričić¹

Background: The COVID-19 pandemic affected both curative and preventive work in primary health care (PHC) facilities. The aim of this study is to examine the impact of the COVID-19 pandemic on the implementation of health education (HE) services in PHC facilities.

Methods: Data on the implementation of HE services obtained from the planning and reporting tables and invoiced services of PHC facilities in 2019 and 2020. Descriptive statistics were used in the statistical analysis of the data, and the data are presented in tabular form.

Results: In the period 2020 - 2019, fewer HE services were provided (by 21% less in pediatric units, by 17% less in gynecological units, by 12% less in polyvalent patronage units, by 31% less in specialist units and by 48% less services in dental units), except in general practice units where 1% more services were provided. In most districts, psychophysical preparation of pregnant women for childbirth was organized in PHC facilities, which was attended by 29% of pregnant women in 2020, which is 14% less than in 2019. The provision of telephone counseling services as individual HE services was realized with 24% in relation to the total number of individual HE services in polyvalent patronage units in 2020, which was at almost the same level (26%) observed in 2019.

Conclusions: This study showed that the COVID-19 pandemic affected the scope of the providing of HE services, which is a consequence of changes in the manner and organization of work of employees in PHC facilities.

Key words: Health Education, COVID-19, Primary Health Care

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Organization of Anesthesiologists Duties in Covid ICUs

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With the emergence of the Covid 19 pandemic and the large number of patients in the ICU, the number of anesthesiologists had to be redeployed to multiple locations: Clinics for infectious diseases, pulmonology, but also in newly built Covid hospitals or hospitals that have been converted into covid hospitals. The territory of Serbia is divided into regions and each region received its own coordinator of anesthesiologists, and special covid hospitals received an anesthesiologist who coordinated the work of all ICUs within the hospital. At one moment, all clinical hospital centers in Belgrade were under the covid regime, and the redistribution of anesthesiologists took place centrally by the main coordinator and the Ministry of Health. The Ministry of Health is playing a major role in this coordination, but every hospital and Anesthesiology service should implement protocols following recommendations. Anesthesiologists usually worked in 6-hour shifts, every day, during a period of 7 days. The anesthetist and the resident of anesthesia were always in the team with the anesthesiologist. Their common task is to treat patients in ICU, to perform invasive and non-invasive monitoring, place the central vein catheter, arterial line, perform intubation and resuscitation, reintubation, transport of patients for diagnostic procedures, but also to perform anesthesia in operating theaters for Covid positive patients in whom emergency surgery is necessary and perform anesthesia for their regular daily operating list.

Due to great knowledge and sacrifice, our Anesthesiology service had well defined flows and processes for the care of Covid-19 patients and excellent results.

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Scope of "Covid" Services for the Number of Given Services in Specialist Consultative Sectors of the Primary Healthcare Facilities in Serbia During the Year of 2020.

Ana Vukša¹

Introduction: According to the valid protocols, health facilities have directed their activities towards services such as diagnosis and treatment of the COVID patients. The objective has been to analyze the amount in which specialist consultative services were used in the primary healthcare facilities, during the situation in which resources were directed towards COVID services.

Method: Analysis of the health institution graphs, standardized and specially curated for diagnosis and treatment of patients with COVID symptoms.

Results: In COVID ambulances of primary healthcare, a higher number of examinations has taken place, compared to the overall number of examinations in the specialist consultative services in the primary healthcare system (in Serbia per 100 patients, 33 versus 31 examinations). Compared to the last year, per 100 patients, there were 16.8 fewer specialist consultative examinations, and their overall number lessened by 36%. Simultaneously, COVID ambulances of primary healthcare have implemented 47 services of sampling for analysis and testing, X-rays, and other services per 100 patients, whereas specialist consultative services realized 70 diagnostic and therapeutic services. Compared to the previous year, there were 52 fewer diagnostic and therapeutic services per 100 patients in Serbia, and their overall number lessened by half the amount (99%).

Conclusion: Due to the COVID-19 epidemic and the urgency of relocating all of the needed resources to combat it, the amount of realized specialistic consultative examinations and services used for diagnostics and treatment of illnesses and injuries was greatly impacted.

Keywords: specialized consultative services, covid services, utilization

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Health Center “Novi Sad” in the Two-Year Fight Against Kovid - Health System Gate Guard

Veselin Bojat¹

Background: The health care system suffered great pressure from a number of patients at all levels of health care during the epidemic and needed to be saved from collapse that would damage public health.

Methods: Respiratory clinics of the Health Center “Novi Sad” have been working continuously since the beginning of the epidemic in March 2020 until today, and their function was the primary contact with patients, suspected covid in the City of Novi Sad and the Municipality of Sremski Karlovci. In addition to the patient's examination, they also underwent a complete diagnosis: laboratory analyzes, X-rays, swabs for PCR testing and rapid AG testing. Clinics working with children, pregnant women and dental patients, clinics with internists and pneumophthisiologists who worked on more complicated cases, as well the isolation break clinics, were singled out.

Results: From March 2020 to March 2022, 258.543 visits to respiratory clinics were recorded. Of that number, 4.856 patients (1.88%) were sent to higher levels of health care. 64.985 X-rays, 167.704 blood samples for laboratory analysis, 64.917 nasopharyngeal swabs for PCR and 110.962 for rapid AG test were performed. Internists examined 5.534, and pneumophthisiologists 9.831 patients whose condition required examinations by these specialists. The isolation dispensaries had 59.313 contacts.

Conclusions: In the two-year fight against covid, the Health Center „Novi Sad” proved to be the undisputed gate guardian of the health system, which was achieved by triage of patients suspected suffering from covid, who were mostly controlled and treated in our respiratory clinics.

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COVID-19 Pandemic, the Role of Institute for Public Health

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Background: On January 30, 2020, the World Health Organization (WHO) declared COVID-19, a public health emergency of international concern. Employees of the Institutes of Public Health (IPH) take an active role in raising people's awareness of infection transmission and measures to combat the pandemic.

Aim: The importance of formal interventions of the IPH in ceasing the spread of the COVID19 pandemic.

Methods: The descriptive epidemiological study. PCR and antigen tests, vaccine distribution and number of persons contacted by telephone were collected from the database of IPH Kragujevac from December 2020 to December 2021.

Results: In the laboratory of IPH Kragujevac, out of a total of 257,836 samples tested by PCR method or antigen test, 26.2% were positive (n = 67,451). The rate of positive patients in the Sumadia district varies from 13.6 in Raca, over 19.5 in Arandelovac, to 26.3 in Kragujevac per 100 inhabitants. In the same period, 46,324 positive persons were contacted by telephone and 60,521 persons received recommendations on prevention of coronavirus infection. The total number of vaccines distributed by IPH Kragujevac to health institutions in the district is 331,502, among them 65.4% Sino-pharm, 23.5% Pfizer, 8.7% Sputnik V, 2.2% AstraZeneca and 0.2% Moderna.

Conclusions: IPH has the main role in the implementation of epidemiological guidelines to end the epidemic. Guidelines for the control of the COVID19 pandemic are in accordance with the Emergency Risk Communication (ERC) package guidelines by WHO.

Keywords: COVID-19 pandemic, Public Health, Guidelines, Covid19 testing

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Healthcare Availability for Patients with Chronic Diseases During COVID-19 Pandemic

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Background: The pandemic has urged countries to reorganize their healthcare. This has caused cancellation/deferment of elective surgeries and face-to-face consultations with physicians, medical inventories shortages, diagnostic modalities delay and overall limited health maintenance globally. This had a major effect on non-COVID-19 conditions, especially on chronic diseases patients. The aim of our study was to assess the healthcare delivery to non-COVID-19 population in Serbia, with the main emphasis on chronic diseases.

Methods: This study was designed as a cross-sectional online survey of a sample of adults about their access to the non-COVID19 healthcare services. It was conducted from April-June, 2021. The survey was in Serbian, and posted on Facebook in four public groups with approximately 83.000 members. The study population consisted of adults who fulfilled the following inclusion criteria: older than 18 years, Serbian language speaker, and member of one of the target Facebook public groups.

Results: There were in total 364 participants of both sex (m/f:30.5%69.5%), with mean age of 37.94±13.35. Among the participants who responded to the question about chronic conditions, one third had at least one 113/244 (31.6%68.4%). Nagelkerke R² had a value of 0.30, and predictors with significant influence on missing an encounter with a specialist were: female gender and chronic disease (AdjustedOR= 2.070, 1.967, respectively).

Conclusions: There is a need for creation of „Chronic care model“ during a crisis such as pandemic, due to great morbidity, mortality and economic burden of these conditions and the fact that virtual healthcare hasn't been widely accepted in low-middle income countries.

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Dr Jovan Apostolovic (1731-1770), the First Doctor in the History of the Serbs, in Novi Sad Treated and Prevented the Spread of the Plague and Cholera Epidemic

Vladimir Sakac¹, Velibor Cabarkapa¹ and Aleksandar Kobilarov¹

Jovan Apostolovic was born in the Serbian part of Buda, Taban, in the then Habsburg monarchy. As a young man, he stood out with his exceptional intelligence and talent, so it was decided to send him to university studies at the Faculty of Medicine in Halle, then the Kingdom of Prussia. In 1757 he became a doctor of medicine, and as an exceptional student he was enabled to receive a doctorate, and in 1760 he defended his doctoral dissertation entitled "How feelings and psychological trauma affect the human body" (*Exibens modum quo affectus animi in corpus Humanum agunt generatim*). He was thus the first doctor in the history of Serbs, but also the first to graduate from faculty! After that, he moved to Novi Sad, where he first did a private practice, and when the danger of spreading the plague from northern Serbia, Belgrade, and from the area of Srem and Banat was noticed, he was elected city doctor. He successfully implemented prevention measures, established medical control of all those who come to Novi Sad, and managed to save the residents from diseases and plague in the city. At the same time, he introduced protection measures with the frequent cholera epidemic.

His dissertation itself was a pioneering work in Europe in relation to much later research on the impact of stress and psychosomatic illnesses.

An initiative is underway to name COVID Hospital in Novi Sad – Dr JOVAN APOSTOLOVIC

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COVID-19 diagnosis, immunization and prevention

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The First World Conference
Fighting COVID-19 Pandemic - Health Challenges

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Challenges with COVID-19 Vaccines in Montenegro - Omicron vs. Delta infection

Igor Galić, MD¹, Ena Grbović, PhD¹, Branko Dujović¹, Miljana Pavličić¹

Background: Montenegro was the last country in Europe with registered COVID-19 cases. On March 17th the first two cases were confirmed and the first victim was a 65-year-old man on March 22nd 2020. On June 2nd Montenegro became the first European country without coronaviruses. Second wave started on June 14th 2020. Vaccination started on February 20th 2021

Methods: The research is a retrospective analysis of COVID-19 data and vaccination status, reinfection among vaccinated and unvaccinated. The paper will use all data from the server of Institute of Public Health of Montenegro.

Results: From the beginning of the outbreak until February 27th 2022, 230 120 cases were registered in Montenegro, 2676 deaths, with death rates of 1.16%. Number of immunized populations was 198 837 (32%).

From August 17th until December 20th 2021 delta was the dominant strain, 54 353 of new cases were registered, with a test positivity of 14.5%. Percent of positive among vaccinated was 37.5%, 9.64% with the third dose. Number of reinfections was 623 (1.15%). Number of deaths was 732 with death rates of 1.35%, 76.5% among them were unvaccinated.

From December 21st until February 27th 2022 omicron was the dominant strain. 68 363 of new cases, the share of positive tests was 30.4%. Percent of positive vaccinated was 48.87%, 24.27% with the third dose. Number of reinfections was 7471 (10.93%) Number of deaths was 296 with death rates of 0.43%, 82.7% among unvaccinated.

Conclusions: Process of monitoring and control of pandemic was adequate in circumstances with delay of vaccination process. Death rate during omicron is lower than in delta wave.

Keywords: COVID-19, pandemic, Institute of Public Health of Montenegro, vaccination, death rates

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EPICOVIDEHA: A Ready to Use Platform for Epidemiological Studies in Hematological Patients with COVID-19

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Background: The coronavirus disease 2019 (COVID-19) pandemic has direct impact on patients with active hematological malignancies (HM), who are at a continuous risk for severe disease course and delay of chemotherapy. The COVID-19 study of the European Hematology Association (EPICOVIDEHA) was initiated in February 2020 by an international steering committee. The aim is to enhance the knowledge of the outcome and clinical management of these patients.

Methods: The EPICOVIDEHA survey is online accessible at www.clinicalsurveys.net. All data are collected anonymously: demographics, underlying diseases, hematological malignancy, COVID-19, and outcome. Inclusion criteria are: age >18 years, active HM within the last 5 years prior to COVID-19, and severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) positive test.

Results: As of March 2022, more than 5,000 adult cases from 40 countries in five continents have been registered. Analyses on specific cutting-edge topics are run after the proposal of any participant with the previous approval of the steering committee of the survey.

Conclusions: EPICOVIDEHA is a ready-to-use survey, whose focal point is to gather epidemiological data from pediatric hematological populations and COVID-19. This study will help to better understand the features of these patients and to ameliorate their clinical management. Additionally, EPICOVIDEHA enables the partnership of international groups of hematologists and infectious diseases specialists, in order to improve the clinical management of HM patients with COVID-19.

Abstract topic: Challenges the health systems are faced with during the pandemic

VACCELERATE Volunteer Registry: A European study participant database to facilitate clinical trial enrolment

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Centro Hospitalar Universitário do Porto – Porto (Portugal)

Medizinische Universität Wien - Vienna (Austria)

Institut National de la Santé et de la Recherche Médicale-ANRS Maladies Infectieuses Émergentes – Paris (France)

Background: Despite clinical trials being rapidly established during this pandemic, identifying suitable study subjects can be challenging. For this reason, the University Hospital Cologne established a volunteer registry for participation in clinical trials first in Germany, which has now been incorporated into the European VACCCELERATE clinical trials network and grew to a European Volunteer Registry. As such, VACCCELERATE's Volunteer Registry aims to become a common entry point for potential volunteers in future clinical trials in Europe.

Methods: Interested volunteers who would like to register for clinical trials in the VACCCELERATE Volunteer Registry can access the registration questionnaire via <http://www.vaccelerate.eu/volunteer-registry>. Potential volunteers are requested to provide their current country and area of residence, contact information, including first and last name and email address, age, gender, comorbidities, previous SARS-CoV-2 infection and vaccination status, and maximum distance willing to travel to a clinical trial site. The registry is open to both adults and children, complying with national legal consent requirements.

Results: As of March 2022, the questionnaire is available in 11 countries and 13 languages. Up to date, more than 36,000 volunteers have registered, mainly from Germany. Within the first year since its establishment, the VACCCELERATE Volunteer Registry has matched 13,719 volunteers to clinical trials. The VACCCELERATE Volunteer Registry will be launched in further European countries in the coming months.

Conclusions: The VACCCELERATE Volunteer Registry is an active single-entry point for European residents interested in clinical trials participation in 11 countries. The registry is currently in the implementation phase in 5 additional countries.

Abstract topic: COVID-19 diagnosis, immunization and prevention

Biomedical Research Center of the Slovak Academy of Sciences - Bratislava (Slovakia)

National Koranyi Institute for Pulmonology – Budapest (Hungary)

Universitaet Bern - Bern (Switzerland)

Universiteit Antwerpen - Antwerp (Belgium)

University of Cologne, Faculty of Medicine and University Hospital Cologne, Chair Translational Research, Cologne Excellence Cluster on Cellular Stress Responses in Aging-Associated Diseases (CECAD) – Cologne (Germany)

University of Cologne, Faculty of Medicine and University Hospital Cologne, Clinical Trials Center Cologne (ZKS Köln) - Cologne (Germany)

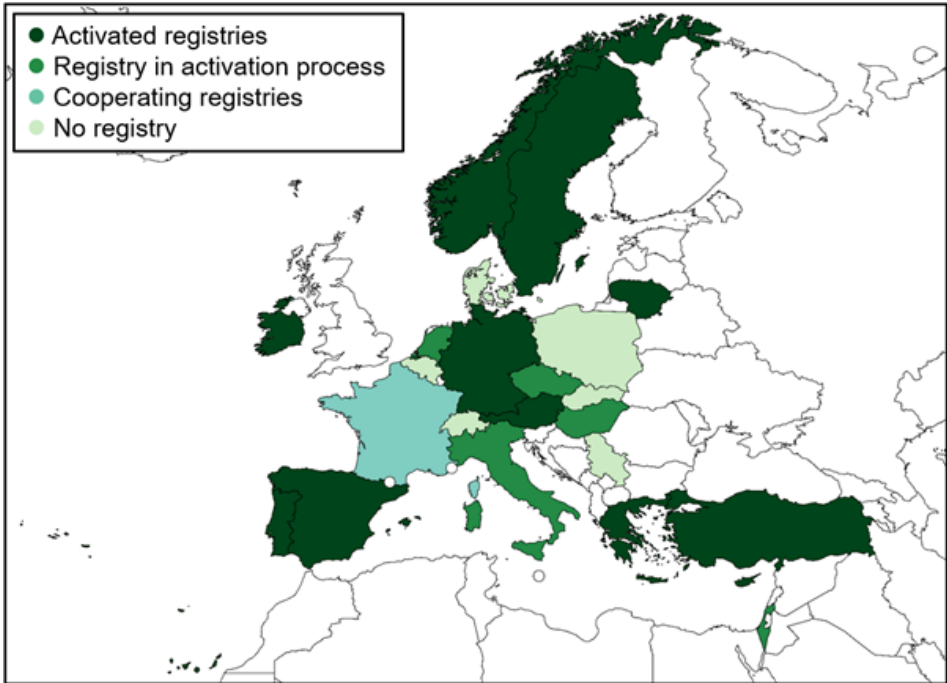
University of Cologne, Faculty of Medicine and University Hospital Cologne, Center for Molecular Medicine Cologne (CMMC) - Cologne (Germany)

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Figure 1. Mapping of the VACCELERATE Volunteer Registries



Results of the Vaccination Against COVID-19 in the Republic of Serbia in 2021

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Dragana Plavša¹, Maja Stošić¹

Background: Vaccination against COVID-19 in Serbia started on 24 December 2020 and five different vaccines were used.

Methods: Immunization coverage was calculated as a proportion of vaccinated persons in different age groups and in the total population. The numerator was retrieved from the national immunization registry. The denominator was obtained from the official population estimates.

Results: 8,217,523 doses have been administered by 31 December 2021. 3,035,863 citizens with residence in Serbia have completed the primary series (43.3% of the total and 52.2% of adult population), while booster dose was administered to 1,708,184 persons (24.5% of total population and 29.6% for adults). The highest coverage with both primary series and booster dose was achieved in the age group 70-79 (78.0% and 58.5% respectively) and 60-69 years (69.5% and 48.1% respectively). The lowest coverage rates were observed in age groups 18-24 and 25-49 years (25.4 and 41.4% for the primary series, and 6.3% and 17.1% for the booster dose). Differences in coverage rates between districts were ranging from 32.9% to 49.9% for primary series, and between 15.6% and 29.5% of the total population for booster dose.

Conclusions: Despite continuous availability of vaccines, achieved coverage was lower than planned, in particular in younger age groups. Factors contributing to such outcomes might be vaccine hesitancy, fear from adverse effects combined with lower perceived risk from the disease in the younger population. Communication campaigns tailored to specific population groups should be designed and implemented from the very beginning of similar immunization campaigns in the future.

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Role on National Infection Prevention and Control Commission During COVID-19 Outbreak

Vesna Mioljevic¹, Ljiljana Markovic-Denic¹, Vesna Suljagic¹,
Gorana Dragovac¹, Zorana Djordjevic¹, Violeta Rakic¹, Ivana Janicijevic¹

Background: The COVID-19 pandemic has demonstrated the critical role of effective infection prevention and control (IPC) measures in protecting patients, healthcare workers (HCWs), and visitors from acquiring this disease.

Methods: Challenges and measures undertaken by the National IPC Commission during two years of the COVID-19 outbreak in Serbia are described here.

Results: National IPC Committee was established in 2003 by the Ministry of Health as a multidisciplinary team to provide input to IPC policy, strategic plans, guidelines, and management. Its role was enhanced during the COVID-19 outbreak in Serbia. Recognizing the COVID-19 epidemic threat, even before the first case in Serbia, on March 6, 2020, the IPC Committee prepared national recommendations for the prevention and control of this disease and the protection of HCWs. The training of trainers was organized using specially prepared presentations. Epidemiologists in hospitals and public health institutes continued to train employees in health institutions. Based on the recommendations of leading world and European health organizations, the Committee prepared and updated different guidelines in the field of IPC and occupational protection that were applied in practice in all health institutions in Serbia. During the two first years of COVID-19 pandemic, 24 such recommendations were written, and the Committee provided assistance in their implementation. Furthermore, The Committee held many meetings through modern IT, constantly monitoring the current situation, and was in constant contact with the stakeholders.

Conclusion: The implementation of uniform safety recommendations supported by qualified human resources facilitated the proper work organization in health care institutions during the COVID-19 pandemic.

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Challenges of the National Immunization Technical Advisory Group (NITAG) during COVID-19 pandemic

Ljiljana Markovic-Denic ¹

Background: The ongoing COVID-19 pandemic is a major concern for all countries as well as a challenge for NITAG in Serbia.

Methods: Challenges and measures undertaken by the NITAG during the two years of the COVID-19 outbreak in Serbia are described here.

Results: Although NITAG has already been formed as an independent, multidisciplinary expert group within the national immunization framework, its role was enhanced during the first year of the COVID-19 pandemic. All NITAG's recommendations are evidence-based. The first step in preparing immunizations against COVID-19 was determining priority groups for vaccination. Serbian's vaccination campaign began on 20 December 2020, but mass vaccination of health workers and other vulnerable groups started in January 2021. Fortunately, five vaccines from different manufacturers and technologies are available in Serbia. A major challenge was the difficulty in finding evidence-based evidence of effectiveness for all vaccines. Recommendations for vaccinating pregnant women and children were the following challenges for NITAG members. Using a booster dose of the vaccine was the following important recommendation, and Serbia introduced it in July 2021. The interval between the second and booster doses was initially six months and was recently shortened to 3 months as recommended by the WHO. The current new challenge is the recommendation for the introduced second booster dose. In parallel with the recommendations on vaccination, NITAG also monitored the records of adverse events after the administration of vaccines.

Conclusion: In Serbia, the NITAGs have a key role in advising on the planning of the COVID-19 vaccination campaign, with ongoing updates and collaboration with the Ministry of Health and health organizations

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The Role of Occupational Health During SARS-CoV-2 Pandemic

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Background: Coronavirus 2019 (Covid-19) is the cause of respiratory infections with a broad spectrum of clinical presentation, from mild forms similar to cold and seasonal flu to severe pneumonia accompanied by respiratory failure. In the Republic of Serbia, the first case of Covid-19 was laboratory confirmed on 5 March 2020. The aim of this study was to determine the demographic and clinical characteristics of those hospitalized patients due to Covid 19 infection, the response to applied therapy and the outcome of the disease, as well as the role of occupational medicine in preventing the spread of Covid infection.

Methods: Overview of the activities of the Serbian Institute of Occupational Health during COVID -19 pandemic.

Results: The Institute of Occupational Medicine has entered the temporary Covid Hospital mode three times so far. By the time the Institute entered the Covid Hospital mode of operation for the first time the capacity of the Institute's clinic had been 40 beds. During the first entry of the Institute of Occupational Health into the temporary Covid Hospital mode, on account of adaptation and reorganization, the number of beds increased to 96. Since the beginning of the pandemic the total number of hospitalized patients in temporary Covid departments was 2004 patients, 1,087 of which were men and 915 women. The youngest patient was 20 years old, while the oldest was 96 years old. The total number of cured patients and patients discharged for home treatment is 1549. The number of patients who were transferred to other health institutions due to deteriorating health is 277, while 7 patients died. Patients hospitalized at the Institute of Occupational Health had a mild to moderate form of the clinical presentation of an infection caused by SARS-CoV-2, who required oxygen support. Patients were treated according to current protocols for the treatment of patients with COVID-19. In addition, Institute of Occupational Health was among the first to vaccinate against COVID-19 with available vaccines: Pfizer, Sinopharm, AstraZeneca and Sputnik V. Vaccination included 19 work organizations with the total of 724 employees, while the Institute of Occupational Medicine employees are all fully vaccinated.

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Conclusions: Exponential growth of the number of infected people in our country has led to the need for engaging all available health capacities in order to fight the new pandemic. Therefore, the Serbian Institute of Occupational Health «Dr. Dragomir Karajovic» entered the COVID Hospital operation mode.

Keywords: COVID-19; SARS-CoV-2; occupational health

Herd Immunity in the Context of COVID-19: a Look Into the Future of the COVID-19 Pandemic

Tatjana Pekmezovic¹

The herd immunity is the most important epidemiological concept in the outbreak regulation in general. At the beginning of the COVID-19 epidemic, every individual in the population was susceptible. If an infected individual enters such a population, the infection spreads rapidly, but when a certain threshold is reached, new infected persons can no longer infect new susceptible persons, because by then the population developed acquired immunity, and the remaining non-immune individuals are indirectly protected. This threshold of herd immunity depends on the basic reproduction number (R_0), which depends not only on the biological characteristics of the agent (SARS-CoV-2), but also on the social and cultural milieu of the population, which means that it can be different in different populations. Data from real life also show difficulties in reaching the threshold of herd immunity. Thanks to the vaccination, some populations are approaching the theoretical threshold of immunity, but the spread of the virus is still difficult to stop.

Based on numerous investigations, key aspects that could affect the COVID-19 pandemic largely depend on the progress of national and global immunization programs, the emergence and spread of new variants of SARS-CoV-2, and the populations' response to non-pharmacological interventions.

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Allergological Risk Assessment for COVID-19 Vaccination: Suggested Approach

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Background: Following the implementation of COVID-19 vaccination programs, severe allergic reactions presenting as anaphylaxis have been reported. Fear of hypersensitivity reactions, especially in patients with atopic constitution, can lead to hesitation for vaccination, and prolong the duration of the pandemic. Given an imperative global need to COVID-19 vaccination, the clinician should be familiar with the risk of potential reactions to vaccines and the approach to their evaluation and management. Many allergy organizations have made their guidelines regarding COVID-19 vaccine allergy safety, including how to screen people with a higher risk of COVID-19 vaccine-associated allergies and how to approach patients with suspected reactions. Group of experts, allergists and clinical immunologists, defined according to literature data (EACCI position paper) and experience of other countries, practical recommendations for allergological risk assessment triggered by COVID-19 vaccines. These recommendations significantly contributed to broader and safer use of five COVID-19 vaccines available in our country.

Results: Algorithms have been developed to assess the risk of vaccine reactions before the first dose of vaccine against COVID-19, as well as to assess the risk and suitability for the second or booster dose after manifested and/or suspected reaction to the previous dose. Algorithms provide practical guidance for the local frontline healthy workers regarding COVID-19 vaccines safety.

Conclusion: The recommendations have significantly facilitated the work of health workers at vaccination points, significantly prevented the occurrence of anaphylaxis and allergic reactions and thus significantly contributed to the successful implementation of vaccination in our country.

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Rethinking of Latent Viral Infections in the Era of Long COVID

Ana Banko¹

Acute COVID-19, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is characterized by a wide range of clinical manifestations, from asymptomatic to fatal. Although the immune response during the acute illness contributes to host defense, it, at the same time, might be involved in the pathogenesis of severe COVID-19, or even lead to critical immune dysregulation. Following acute SARS-CoV-2 infection, in up to 75% patients, physical and neuropsychiatric symptoms develop and persist months after infection with poorly underlying pathophysiology.

Some of long-term symptoms associated with COVID-19, known as long COVID (LC), could be driven by chronic reservoirs of infection or latency-related viruses. Thus, post-acute COVID state allows previously harbored and successfully controlled viruses, to replicate. For example, reactivation of EBV, HHV-6, HHV-7, VZV and HSV-1 has already been demonstrated in patients with acute or severe COVID.

As SARS-CoV-2 infection might instigate or exacerbate different biological abnormalities, lead to herpesvirus reactivation and infection of new body sites or drive new chronic symptoms, the question is, what could be the consequences of such reactivation in the spectrum of herpesvirus associated pathogenic processes such (lymphoproliferative disorders, cancers, autoimmune diseases, neuroinflammatory processes...)? So far, herpesvirus induced diverse set of rashes and skin lesions, tinnitus and hearing loss, hematological, cardiovascular, and neurological complications has been reported in LC. This not only might be associated with the severity of COVID-19 itself, but also with exacerbation of the underlying disease in immunosuppressed patients or even pathogenesis of Myalgic encephalomyelitis or chronic fatigue syndrome (ME/CFS).

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COVID-19 Occupational Disease or Occupational Injury?

Petar Bulat^{1,2}

Background: With the beginning of the pandemic and the first illness of health care workers, the question arose whether COVID 19 could be classified as an occupational disease or an occupational injury. According to Serbian law on

Methods: Review of existing regulation related to COVID 19 as an occupational disease. Results: According to the Law on Pension and Disability Insurance and Article 22, paragraph 4, it is stated that an occupational injury is also considered an illness of the insured that occurred directly or as an exclusive consequence of an accident or force majeure while performing work on the basis of which he is insured. By a broader interpretation of the term "accident", COVID 19 can be classified as an occupational injury.

Based on the Law on Pension and Disability Insurance Article 22. and the Rulebook on Occupational Diseases, there are grounds to classify COVID-19 as occupational diseases. This has been done in most EU countries as well. According to available data, 17 EU countries classify COVID 19 as occupational disease (Bulgaria, Cyprus, Croatia, Czech Republic, Estonia, France, Hungary, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia and Sweden) as well as two countries. non-EU members (Switzerland and Norway). In three EU countries, COVID 19 is classified as an occupational injury (Italy, Slovenia and Spain), and in five countries it is classified as an occupational injury and occupational disease (Austria, Belgium, Denmark, Germany and Finland). A specific case is Greece and Ireland, where COVID 19 is associated with work but is not classified as an occupational injury nor as an occupational disease.

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Job Strain Among Employees at Serbian Institute of Occupational Health During COVID-19 Pandemic

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Background: Job strain is a form of psychosocial stress that occurs at the workplace. It is caused by interaction between job demands and decision latitude, and can be modified by supervisor or coworker support. Covid 19 pandemic put a special burden on employees demanding higher skill discretion and decision authority at first, and increased job demand later on. Serbian Institute of Occupational Health has been working partly as Temporary COVID 19 hospital since 2020.

Methods: Cross sectional study conducted during January 2022. We used the 22 item Karasek' Job Content Questionnaire.

Results: There were 98 workers in the study, 81% response rate, 60 female and 19 male, among them 45,6% were engaged in Temporary COVID 19 hospital, 41.7% in regular jobs and 12.7% in vaccination teams. There were 58.2% healthcare workers (HCW), HCW associates 20,3%, administrative 13.9%, with an average age of 48.1 years.

We found job demand higher in HCW engaged in COVID 19 than in the regular job group ($p<0.05$), as well as job strain ($p<0.05$). Skill discretion, decision authority and decision latitude were lower in the low education group ($p<0.01$). Supervisor support was higher in HCW with up to 10 yrs of service than in those over 20 yrs ($p<0.05$). There was no difference in job strain across the age groups. Skill discretion was lower in administrative than in HCW ($p<0.01$). HCW associates had the highest decision latitude ($p<0.01$) and decision authority ($p<0.05$). Administrative workers had the lowest supervisor support ($p<0.05$).

Conclusions: Job demand and Job strain were higher in HCW with no difference across the age groups.

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COVID-19 Booster Dose Administration in Serbia: Initial Results on Reactogenicity

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Marija Milic^{1,3}, Dragana Plavska¹, Vladan Saponjic¹

Background: The Republic of Serbia started administering booster doses of COVID-19 vaccines to individuals six months after receiving the second dose. The aim of the study was to explore reactogenicity of the vaccines as well as factors associated with adverse events following vaccination.

Methods: Panel study was performed in September 2021. Reactogenicity data were collected on days 7 and 28 after COVID-19 booster vaccination by interviewing the participants using the questionnaire related to local and systemic adverse events.

Results: Of 300 study participants, 61.7% were female. The mean age was 52.7 (SD=14.3). Pfizer-BioNTech was the most common COVID-19 vaccine used by 226 (75.3) participants, while 60 (20%) and 14 (4.7%) used Sinopharm BBIBP-CorV and Sputnik V, respectively. Older age, i.e. 65+ years (OR =0.31; 95%CI =0.11–0.87) and Sinopharm BBIBP-CorV booster (OR =0.23; 95%CI =0.07–0.67) are found to be independently associated with less intense local adverse events within 7 days after booster dose. Female sex (OR =1.77; 95%CI =1.01–3.12), previous COVID 19 (OR =3.62; 95%CI =1.13–11.63) and adverse events after the second dose (OR =2.66; 95%CI =1.33–5.32) were found to be independently associated with more intense systemic adverse events within 7 days after the booster dose.

Conclusion: Adverse events observed after receiving any of the three COVID-19 vaccines (Pfizer/BioNTech, Sputnik V and Sinopharm BBIBP-CorV) were mild to moderate. The incidence and severity of adverse events after inactivated vaccines are the lowest compared to mRNA or vector vaccines.

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Clinical Laboratory Diagnostics in COVID-19 Pandemia: Focus on Biochemical and Hematological Biomarkers

Sanja Stankovic^{1,2}, Milika Asanin^{1,3}

Background: The contribution of biochemical and haematological laboratory biomarkers testing to our collective pandemic response is of extreme importance. Although these biomarkers are not specific enough to diagnose SARS-CoV-2 infection, they have been reported to be useful in the risk stratification, monitoring and prognostication of patients with diagnosed coronavirus disease 2019 (COVID-19). The key role of biomarkers is to predict the progression of COVID-19 towards poor outcomes such as the need for mechanical ventilation/intensive care, progression to multi-system organ failure, and in-hospital mortality. The aim of this presentation is to summarise the available literature data on the association between common haematological and biochemical parameters and COVID-19 disease clinical course and outcomes with special focus on the IFCC Task Force on COVID-19 guidelines.

Methods: A systematic review of the published studies was carried out to identify relevant articles using EMBASE, MEDLINE, Web of sciences. Keywords to refine the search included 'COVID-19', 'SARS-CoV2', 'Biomarkers'.

Results: The following biomarkers associated with COVID-19 have been identified: haematological (lymphocyte count, neutrophil count, neutrophil-lymphocyte ratio, platelets, D-dimer, PT/APTT, fibrinogen), and biochemical markers including inflammatory, biomarkers of multisystem organ failure/damage, cardiac markers, arterial blood gas parameters of respiratory function. Also, the consideration in test interpretations and current limitations of biochemical/haematological monitoring of COVID-19 patients will be presented.

Conclusions: In addition to the spectrum of currently available 'routine' biochemical/haematological biomarkers, novel biomarkers, such as non-coding RNAs, proteomics, for disease progression and severity of COVID-19 are looming on the horizon. Multi-marker strategies have the potential to better personalise the care of COVID-19 patients.

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Clostridioides Difficile Infection in COVID-19 Hospitalized Patients

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Background: Due to COVID-19 microbiome alterations and the extensive use of antibiotics, COVID-19 can be complicated by co-occurring *Clostridioides difficile* infection (CDI). We analyze the frequency, risk factors, clinical form and outcomes in patients with SARS-CoV-2 and CD co-infection.

Methods: We performed a retrospective study from September 2th 2021 to March 1st 2022 including patients with CDI and COVID-19 coinfection who were admitted to Covid Hospital, University Clinical Center of Vojvodina.

Results: During the study period a total of 4942 COVID-19 patients were admitted to Covid Hospital, of which 1001(20,25%) had diarrhea and 278(5,62%) were CDI positive. The mean age of CDI patients was 69 years, 59.4% were male. 22 (7,91%) had CDI on admission and 256 (92,08%) had hospital-onset (HO-CDI). Median day of HO-CDI identification was 12,84 days. Most of the patients had multiple comorbidities, cardiovascular diseases, diabetes, chronic kidney disease and nervous system disease were the most frequent. Antibiotics received 92,64% of patients. The most commonly administered antibiotics were ceftriaxone, cefepime, levofloxacin, meropenem. The clinical form of CDI range from mild diarrhea (28%) to severe colitis (62%). CDI therapies were oral metronidazole (21%), vancomycin (61%), oral and rectal vancomycin plus intravenous metronidazole (18%). Regarding outcomes, 70,2% patients recovered and discharged at home and 29,8% died in hospital. The mean age was 78 years and CDI was not considered the main cause of death in these patients.

Conclusion: Elderly patients with many comorbidities are most affected by Covid-19. The widespread antibiotic use is an important risk factor in Covid-19 and CD co-infection.

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Results of Epidemiological Survey over Intrahospital Infections in Covid Hospital Batajnica: Causes and Resistance

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Background: Continuous epidemiological surveillance over healthcare associated infections (HI) allows for us to monitor: epidemiological situation, frequency of causes, their resistances and prevention and control measures in spreading multidrug resistant organisms (MDRO) in a hospital environment. Treatment of HI caused by MDRO presents a great therapy problem in treating patients with COVID 19. The aim of the study was to determine: Incidence of HI and patients, prevalence of HI types, HI causes and their sensitivity to antibiotics from 01.05.2021. to 31.12.2021.

Methods: Introduction to basic epidemiological aspects of colonization and infection of *Acinetobacter* spp. recommendations of the Center for Disease Control and Prevention (www.cdc.gov/getsmart/healthcare).

Results: Patient incidence rate was 2.99, while the infection incidence rate was 4.33. The most common HI were urinary infection at 37%, followed by gastrointestinal tract infections 23%, laboratory confirmed infections of blood were at 22%, followed by pneumonia 11% and superficial infections at 7%. Most common HI causes were *Acinetobacter Baumani* 21%, *Klebsiella* spp. *Enterobacter* spp 19%, *Klebsiella pneumoniae* 18%, *Candida* spp, 15.7% and *Clostridium difficile* 11%. HI causes show high percentage of resistance to different classes and types of antibiotics which are used to treat critically ill patients with COVID 19.

Conclusion: Importance of epidemiological surveillance over HI in Covid Hospital Batajnica is necessary in monitoring causes of HI, their sensitivity to antibiotics and prevention and control measures of MDRO in a hospital environment. MDRO presents a great therapy problem in treating critical patients with COVID 19.

Keywords: epidemiological surveillance, HI, MDRO, COVID 19

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Point-Prevalence Study: Antimicrobial Use in Hospitalized Patients With COVID-19

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Background: Studies of bacterial and fungal infections in patients with COVID-19 suggest that the incidence of these infections is low, but a large number of patients receives antibiotics upon admission to hospital or during hospitalization. Studies and systematic reviews reported the use of antimicrobials in up to 38.3–74.6% of patients.

Methods: We conducted an international multicentre point-prevalence survey (the first point-prevalence study) to collect comprehensive data on the characteristics and differences of antibiotic and antifungal prescribing in hospitalized patients with COVID-19. In seven tertiary university hospitals in Croatia, Italy, Serbia and Slovenia, 988 COVID-19 patients were enrolled and 521 were receiving antibiotics and/or antifungals (52.7%; range across hospitals: 32.9–85.6%) on the day of the study.

Results: Use of antibiotics and antifungals was common in intensive care units (ICUs) (135/186, 72.6%; range across hospitals: 54.1–100%) as well as in medical wards (386/802, 48.1%; range across hospitals: 14.3–93.6%). The majority of patients received antibiotics and/or antifungals within 48 h of admission (323/521, 62%; range across hospitals: 17.4–100%), their most common use was empirical (79.4% of prescriptions), and pneumonia was the main indication for starting the treatment.

Conclusions: The data from our study show that early empiric use of broad-spectrum antibiotics is common in COVID-19 patients, and that the pattern of antimicrobial use varies from hospital to hospital. The widespread use of last-line antibiotics identified in some settings, combined with the heavy burden of hospitalized COVID-19 patients, may lead to a substantial increase in AMR.

Keywords: COVID-19; antimicrobial use; multicentre; point-prevalence study

Acknowledgments: We would like to thank the members of the COVID-PPS study group

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The Role of Whole-genome Sequencing in COVID-19 Pandemic

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Background: Numerous scientific and public health institutions have emphasized the role of genetic sequencing of SARS-CoV-2 in documenting key changes in every part of the genome, with certain mutations leading to increased virulence, viral transmission, and more severe disease. The COVID-19 pandemic is the first pandemic in which whole genome sequencing (WGS) capacity has been available to the public health sector from the very beginning.

Methods: Whole genome sequencing of SARS-CoV-2 isolates from Serbia was performed using the Oxford Nanopore platform and ARTIC nCov-2019 c. V3 sequencing protocol.

Results: The presence of 20A, 20B, 20C, 20D, 20E (EU1), 20G, 20I/Alpha, 21I/Delta, 21J/Delta, 21K/Omicron and 21L/Omicron variants of SARS-CoV-2 was detected with different frequency during epidemic. At the beginning of the epidemic, there was a multiple independent introduction of the virus into Serbia from different countries. The largest number of variants was proven during the third peak of the epidemic in the period from October to December 2020, followed by the dominance of the 20I/Alpha strain. In July 2021, the British strain was quickly replaced by the Indian variant (21I/Delta and 21K/Delta) which was dominant until the end of 2021. The first cases of 21K/Omicron variant were detected in December 2021, with the increased frequency of this strain in the following months along with the appearance of 21L/Omicron or "stelt" variant.

Conclusion: Genomic monitoring of SARS-CoV-2 variants is crucial to assess the circulation of the virus in the population and to improve public health prevention measures.

Key words: SARS-CoV-2 variants, Whole genome sequencing, genomic monitoring, mutation, vaccine immunity escape

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Nuclear Medicine in the times of COVID-19 - risks and new safety standards-single institution experience

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Tamara Anđelković¹, Milena Rajić¹

Background: The first cases of coronavirus disease 2019 (Covid-19) were seen in Wuhan, China, in late December 2019 before spreading globally. The current outbreak was officially recognized as a pandemic on 11 March 2020. The aim of this study is to analyze the changed mode of operation, safety measures and procedures at the Center of Nuclear Medicine, University Clinical Center Niš (CNM), the only nuclear medicine center in Serbia that had no work lockdown during the epidemic, and to propose a system of protective measures to be taken in the face of potential new pandemic waves.

Methods: An epidemiological survey was conducted on all patients admitted to hospital. Starting from May 2021, SARS-CoV-2 fast antigen or PCR tests were performed in patients being treated by radiopharmaceuticals in therapy units. Protective measures for staff were introduced at the height of the coronavirus epidemic in the Republic of Serbia according to WHO guidelines.

Results: Decreased number of all procedures in CNM were noticed only In March and April 2020. After that period, in 2020 and 2021, the usual number of all diagnostic and therapeutic procedures was performed. So far, none intrahospital Covid-19 disease spreading of the staff involved in performing diagnostic or therapeutic procedures was noticed.

Conclusion: At the Center for Nuclear Medicine, a decrease in the number of performed procedures was recorded only in the period March-April 2020, while the number of analyzes and procedures in the later period was as common as in pre pandemic times.

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The Efficacy and Safety of Vaccination Against SARS-CoV-2 Infection in Rheumatic Patients Receiving Biological Treatment

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Background: Given the fact that there is no effective cure for COVID-19, as well as severe economic consequences of implementing isolation measures, vaccination against SARS-CoV-2 is currently the best way to get out of this pandemic. Since patients with rheumatic diseases often require immunosuppressive therapy which may increase the risk of developing a severe clinical picture within COVID-19, the importance of immunization of this group of patients is of particular importance.

Aim: To investigate the type and frequency of adverse reactions following vaccination, as well as COVID-19 disease occurrence after vaccination in patients with inflammatory rheumatic diseases treated with biological therapy.

Methods: During the period from June-August 2021, a study of the scope, efficacy and safety of vaccination of certain subgroups of patients was conducted at the Institute of Rheumatology using a structured questionnaire in paper and digital format. The study included patients with inflammatory rheumatic diseases on biologic therapy, while the control groups consisted of patients on conventional disease-modifying therapy (csDMARDs), as well as patients with degenerative diseases of the musculoskeletal system.

Results: A total of 446 patients (316 on biological therapy, 77 on csDMARDs and 53 with degenerative rheumatism) were included in this study. In the group of patients on biological therapy, 58.9% were completely vaccinated, 3.2% received the first dose, and 38.9% were not vaccinated. In the other two groups numbers were 64.9, 2.6%, 32.5% and 79.2%, 3.8%, 17% respectively. In the group of vaccinated patients receiving biological treatment, 25.4% had an adverse reaction after the first dose, 22.3% after the second dose, and for other two groups numbers were 19.2%, 12% and 13.2%, 11.3% respectively. The most common side effects were pain at the injection site, fever and fatigue. Regarding the total number of unvaccinated patients (n = 157), 28% (44) had

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COVID-19 during follow-up period, while only 5% (15) of the total number of vaccinated ($n = 289$) had a diagnosis of COVID-19 after vaccination ($p < 0.001$), independent of the vaccine manufacturer.

Conclusions: This study confirmed the efficacy of the vaccines, as well as the fact that fully vaccinated patients receiving biological therapy have a lower risk of developing COVID-19 compared to unvaccinated. Regarding adverse events, there was similar occurrence and severity comparing different groups of patients.

Challenges in the Organization of Facilities for Hospitalization of Covid Patients at the University Clinical Center Nis – Epidemiological Aspects

Nikola Milenković¹, Sonja Novak¹, Nadežda Popović¹, Jasna Stojanović¹

Background: Hospitals around the world have played a key role in responding to the COVID-19 pandemic through the hospitalization and care of covid patients. The highest pressure on the University Clinical Center Nis (UCC Nis) was in April 2020, when the capacity to care for covid patients suddenly increased. In parallel, the UCC Nis was under pressure to preserve the functioning within the “green” zones.

Methods: This paper describes the planning, development, and implementation of the master project. The project covered the formation of different zones in the new building, routes of patients and employees, disposal of infectious waste, food, laundry, and protective equipment.

Results: With a usable area of 39,500 sqm, the new building of the UCC Nis is divided into two structures. It has seven floors and can accommodate 500 patients at the same time. Starting from April 2020, more than 5,000 patients have been treated. As the only tertiary institution in southeastern Serbia, the UCC Nis had to preserve the functioning of 17 surgical rooms and the constant work of the Emergency Center, along with the care of covid patients. It required dividing the building into green and red zones and forming “sandwich” zones within one building or floor where the participation of a clinical epidemiologist was crucial.

Conclusions: Given the high frequency of patients and a large number of health professionals, it was a great success to have a low rate of in-hospital infections reflected in the small number of infected health workers and patients from the “green” zone.

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COVID-19 Immunization of Medically Vulnerable Groups of Population: UKC Nis Emergency Center Vaccination Spot

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Background: People with allergies, those with chronic diseases, immunodeficiency, cancer and those with fear in general, were considered an 'in-risk' category due to an uncertain outcome. In April 2021 University Clinical Center Nis established a special vaccination spot for this population under the highest level of medical precaution.

This paper aimed to present the outcomes and experience from this vaccination spot.

Methodology: The study was done between April 2021 and January 2022. After registration at the vaccination spot, people have had a medical checkup with the medical team. If indicated, pre medications applied. After being vaccinated with a vaccine of choice, the person was requested to stay a minimum of 30 minutes under supervision.

Results: There were a total of 1999 people vaccinated from Serbia and the region (ages 14 to 90). Among them 1290 were female (64,53%). There were a total of 3692 doses applied, 1999 people were vaccinated with one dose, 1486 with two doses, and 207 with three doses. Out of 3692 doses, 2034 (55,09%) were Sinopharm, 1581 (42,82%) Pfizer, and 77 (2,08%) Sputnik V. The most common reasons to attend vaccination at the spot were in 58% allergies, in 31% the presence of coexisting conditions, and 11% other. There were in total 15 cases of medical assistance for non-vaccination related conditions, and only 2 reported unwilling reactions, by authority not declared as serious adverse events.

Conclusion: It is proved that there was no other contraindication for vaccination against COVID19, except for the general contraindications such as allergy on the vaccine components and acute ill health.

Key words: COVID 19 immunization, medically vulnerable population

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Prevention of the Nosocomial Transmission of SARS-CoV-2 at University Clinical Center, Niš: Challenges and Lessons Learned

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Background: In-hospital transmission of SARS-CoV-2, a highly contagious disease, has been reported at various institutions in different countries. The healthcare services had to adapt to the high demand for hospitalizations in order to contain hospital outbreaks. We aimed to present challenges faced and lessons learned during preventing nosocomial transmission of SARS-CoV-2 among in-patients at a tertiary care teaching hospital.

Methodology: The study was done between April of 2020 and January of 2022 at University Clinical Center, Niš. To maintain the hospital setting a safe environment for non-covid patients, we applied the guidelines established by the Ministry of Health Republic of Serbia, Institute of Public Health Serbia, CDC, ECDC and WHO and developed and employed our protocols unique for each of 27 clinics based on its specifics. Protocols have been changed and adapted timely following epidemiological situations and epidemic waves. Key surveillance tools involved the established database, log-checked with 'Covid19 Portal of RS' and 'Service of Public health - immunization database', designed as a prompt alarm system in preventing a potential nosocomial Covid-19 outbreak.

Results: The epidemiologists have developed a multi-layer algorithm of protection and timely upgraded it. The protocols included three layers of protection for control of SARS-CoV-2 and focused on antigen testing at the right time and providing health care service in the adequate "zone". Clinics who strictly followed the established protocols showed a high level of virus transmission control.

Conclusion: The nosocomial transmission by SARS-CoV-2 was present, but the preventive measures instituted according to established protocols could be significantly successful.

Key words: SARS-CoV-r2, health care-associated infection, infection prevention and control

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COVID-19 Sinofarm Vaccine Induced Chronic Spontaneous Urticaria (CSU) and its Relation to Gene Polymorphisms of Inflammatory Cytokines- a Genetic Risk Factor

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Background: Allergic hypersensitive reactions to different COVID-19 vaccines are reported.

Methods: We present here the case of a 48-year-old female patient who suffered from allergy after the first dose of the Sinofarm Covid-19 vaccine.

Results: She developed erythema, edema, followed by a pruritic rash located on the right upper arm. In her anamnesis she reported a number of preexisting risky conditions: frequent allergic urticarial reactions, followed by red, itchy bumps and welts and allergic bronchitis (without swelling of the larynx and suffocation), tearing of the eyes and itching in the spring months. The last happened 5 years ago. She also suffered from strophulus caused by mosquito bite, afterwards she developed residual hyperpigmentation. She lives in a countryside, her changes have become more frequent after the great floods (2014) in that area and the colonization of mosquitoes. She received anti-allergic cocktails (corticosteroids and antihistamines) several times. She is a smoker. She has two daughters, the younger one has frequent allergic reactions as well. In laboratory analyses very pronounced has been the rise of IgE of 1650 IU/mL (<100 IU/mL normal value) and Anti-parietal antibodies 27.3 (<10 IU/mL normal value), while IgG decreased to 6.85g/L (7-16g/L) and Anti-CCP-2 Abs were

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normal ($<7\text{U/mL}$). Having in mind that different cytokines may have an effect on allergic immune-inflammatory reactions, we performed gene polymorphism analyses for cytokines (TNF- α -308, TGF- β -509 and IL-6), and protein tyrosine phosphatase PTPN22 gene. The examined sample was a normal homozygote, ie. GG genotype for TNF-alpha, IL-6 and PTPN.

Conclusion: Heterozygote polymorphism registered for TGF- β -509 may be a pre existing genetic risk factor.

Key words: Sinofarm Covid-19 vaccine, allergy, gene polymorphisms

Determination of IgG S and N Antibodies to COVID-19 virus by ELISA test

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Background: SARS-CoV-2 virus triggers both cell-mediated and humoral immune responses that further produces antibodies against specific viral antigens such as spikes (S-protein), and nucleocapsid (N-protein). Therefore, previous Covid 19 infection can be confirmed by the presence of serum S or N antibodies. However, vaccines against COVID-19 also result in presence of IgG S antibodies in serum. This study aimed to compare the presence of IgG S and N antibodies in adults with known and unknown vaccination statuses.

Methods: Screening for antibodies was done using the ELISA method in 2078 subjects during 2021.

Results: Of all the tested subjects, IgG S antibodies were detected in 52% cases, N-ones in 6.59%, both S and N antibodies in 14.58%, and 26.8% had no antigens. Vaccination status was known in 286 subjects. Of the 146 subjects who received the Sinopharm vaccine, 37% had no antibodies detected. Of the 104 subjects who received Pfizer-BioNTech, 8.65% had no antibodies. In the Sputnik V vaccine, no antibodies were detected in 16.6% of 36 subjects.

Conclusion: Having in mind that S antibodies can block the binding of S protein to the cellular human ACE2 receptor and prevent the entry of Covid 19 virus into the cell and that there is no evidence that N antibodies can prevent infection, we might conclude that the history of vaccination or previous infection must be taken into account when interpreting the results of the Covid 19 virus antibody test and that N candidate is suitable for early diagnosis of infection.

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Risk Factors for Nosocomial Clostridium Difficile Infection in COVID-19 Patients – Experience from Covid Hospital Kruševac, University Clinical Center Niš

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Background: Clostridium difficile (CD) is a cause of nosocomial infection. It is a consequence of aggressive antibiotic treatment in immunosuppressed patients. The aim of the study was to assess the factors for nosocomial infection (NCDI) onset and to determine their impact on the course of the disease.

Methods: The data of two groups of patients with NCDI (January - June and July - December 2021) were analyzed. They were grouped according to epidemiological and clinical parameters, gender and age. Parameters were compared with antibiotic therapy (ABTh) and comorbidities. Student's T-test, Mann-Whitney, Chi-squared and Fisher's exact test were used.

Results: Out of 6068 patients, 392 developed NCDI; 273 (7.03%) in the first group and 119 (3.06%) in the second one. Females dominated (213), mean age was 65.42±7.24 vs. 64.34±6.65). Hospital stay duration was statistically significantly lower in the second group (24.48±2.65 vs. 16.91±2.07); as for ABTh, cephalosporin (65.5%), quinolones (52.1%) and carbapenems (18.5%) were administered. Treatment duration in the second group is significantly shorter (20.7±1.59 vs 12.5 ±0.50) and recovery rate is higher (75.7% vs 89.27%). Comorbidities include: cardiological (57.87% vs 56.03%), endocrinological (34.43% vs 31.93%), neurological (16.8% vs 27.5%), and nephrological (17.9% vs 29.2%). Lethal outcomes were registered between the 4th and 11th day of treatment (16.1% vs 8.9% patients).

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Conclusion: Combination ABth, its duration, comorbidities, and the length of stay in hospital are factors for NCDI onset. Rational use of antibiotics, effective probiotics, and decontamination measures in the management of COVID-19 are priorities in preventing NCDI.

Key words: Clostridium difficile, COVID-19, comorbidities, prevention

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Myths and Facts About COVID-19 and Vaccination in the Reproductive Period of Women Frequently Asked Questions in the Polyclinic KBC Zemun

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Background: Women in the reproductive period who have been exposed to COVID-19 represent a particularly sensitive category.

Methods: By reviewing the available literature, the known facts, including frequently asked questions and concerns of patients regarding COVID-19 and female reproductive health are discussed.

Discussion: COVID-19 is a serious disease that can damage female reproductive organs. Additional disorders are possible during pregnancy. The most important negative pathophysiological disorders of COVID-19 reproductive infection are renin-angiotensin system (RAS) dysregulation, cytokine storm, reproductive dysfunction, oxidative stress and increased body temperature. At the moment, the justification of vaccination against COVID-19 among the pregnant population relies on the analysis of monitoring data of pregnant women after accidental or conscious vaccination. None of the existing COVID-19 vaccines contain live viral components, which would pose an obstacle for administering them among the population of pregnant women. The unique opinion is that vaccination can be carried out in the puerperal period, as well as during lactation.

Conclusion: Today, COVID-19 vaccines are the only successful means of fighting SARS-CoV-2 infection because they prevent or significantly alleviate the disease, and they significantly reduce all risks of severe disease. There is no evidence suggesting that COVID-19 vaccines can reduce fertility potential or that pose a particular risk to women who are in the reproductive period, pregnant, or breastfeeding. Vaccination does not increase the risk of miscarriage. Pregnant women can get vaccinated at any stage of pregnancy; however, it would be desirable to avoid vaccination in the first trimester of pregnancy.

Key words: Covid-19, pregnancy, reproductive period

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Epidemiological Characteristics of COVID-19 Positive Patients in Prehospital Triage Centre – Experience of Clinical Hospital Centre Zemun

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Background: Coronavirus19 (Covid19) is a contagious viral respiratory disease which caused a pandemic acknowledged by the World health organisation in 2020. Pre-hospital coronavirus triage centre within Clinical Hospital Centre Zemun (PCT-CHC) provided additional treatment/follow-up to previously Covid19 diagnosed patients, or indicated further hospitalisation. Our aim was to evaluate epidemiological and demographic characteristics of Covid19 positive patients treated in PCT-CHC.

Methods: Study included Covid19 positive patients treated in PCT-CHC from September until December 2021. Randomly selected patients were offered to fill in an anonymous closed-type questionnaire, which investigated demographic and socio-epidemiological circumstances leading to the COVID-19.

Results: Out of 9966 patients treated in PCT-CHC, 1200 (12.04%) required hospitalisation. Out of the total number of examined patients, 226 patients responded. More than a half were women (55.8%). Most of the patients were older than 60 years (53.1%, $p\text{-value}<0.001$), mean age 58.35 ± 16 years. There was no statistical significance regarding vaccination status. Sinopharm™ has been the most prevalent vaccine administered among examined patients (66.3%); it is also the most applied Covid19 vaccine in Serbia. Almost all patients had COVID-19 for the first time (94.2%). Patients who required hospitalisation (20.5%) were predominantly older (mean age 66.8 years, $p\text{-value}<0.000$), and non-vaccinated (67.5%, $p\text{-value}<0.05$). Statistically significant difference was found analysing distribution of previous lung diseases according to hospitalisation of patients ($p\text{-value}=0.008$).

Conclusion: According to analysed data, vaccinated patients have milder form of the disease, thus a lower hospitalisation rate. Non-vaccinated and older people with previous lung disease are at higher risk of severe forms of COVID-19.

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RT-PCR Based SARS-CoV-2 Detection Method: Utility of Retesting for Diagnosis of SARS-CoV-2 in Cases of High Values of Ct

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Background: In response to the current COVID-19 pandemic have been developed many commercial tests to detect severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Real-time reverse transcription polymerase chain reaction (RT-PCR) tests for SARS-CoV-2 are occasionally repeated when suspecting false-positive or negative results according to the value of Ct. False results have important implications for the management of COVID-19. Our attention is focused on additional verification of high values of Ct to confirm the obtained results.

Methods: In our laboratory, RT-PCR analyses were used to detect the SARS-CoV-2 from nasopharyngeal swabs. Tests from two manufacturers, 2019-nCoV (Sansure Biotech) and Xpert Xpress SARS-CoV-2 test (Cepheid), were used. Isolation of RNA for 2019-nCoV was conducted by Sample Release Reagent (Sansure Biotech).

Results: Between May to November 2021. we tested 88,708 samples, from this number 7,669 were positive and among them, 224 were weakly positive when we used the 2019-nCoV test. In a retest of 224 borderline positive samples with the Xpert Xpress SARS-CoV-2 test, positivity was confirmed in 72.3%. The percentage of negative samples after retest was 27.7 %.

Conclusions: Based on the obtained results, it can be concluded that it is necessary to pay special attention when interpreting the weakly positive results of RT-PCR testing. In the retest process, when there is a possibility for that, the use of tests of different characteristics has high importance. This would benefit the healthcare community and potentially avoid unnecessary patient isolation, contact tracing, and outbreak declaration.

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Experiences and Aftermath of the COVID-19 Lockdown Among Community-Dwelling Older People in Serbia: a Qualitative Study

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Background: At the beginning of the COVID-19 pandemic in March 2020, the Serbian government instituted a 24-hour curfew for people aged ≥ 65 years for 2 months. The aim of this study was to examine the experiences and perceptions of curfew for older people in Serbia 15 months after the curfew had ended.

Methods: In-depth interviews were carried out with 23 older adults from urban areas in Serbia. By purposive sampling we identified the first 3 participants, while others were selected using the snowballing method. The interviews were audio-recorded, transcribed and data were analyzed according to guidelines for qualitative studies.

Results: Six topics emerged: 1) Perception of the curfew announcement; 2) Attitude toward the curfew; 3) Organization of daily living; 4) Mood; 5) Frustrations/limitations and 6) Making sense of the curfew 15 months after. Older people in this study overall remember not feeling disturbed by the curfew because they perceived it as prevention, especially because this population group is considered to have the highest rate of mortality from COVID-19. Some people remember being extremely frustrated because of the restrictions and considered them unnecessary. Most people remembered that the lack of social interactions and lack of physical activity were the most difficult to cope with.

Conclusions: Although challenging and bothersome, the majority of older people in this study accepted the curfew as an appropriate measure to avoid catching the virus and combat the COVID-19 pandemic.

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Epidemiological and Clinical Characteristics of Patients Infected With SARS-CoV-2 Virus in Covid Hospital Zvezdara

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Background: The coronavirus disease (COVID-19) caused an unprecedented burden to the whole community and exhausted healthcare systems worldwide.

Method: A retrospective study was conducted at Covid Hospital Zvezdara in the period 1.4. 2020. until 27.11. 2021. when the hospital was interrupted five times in covid mode. All patients who were treated for SARS CoV-2 infection during that period were included.

Results: In the period of two years, a total of 7621 patients were hospitalized. The average age was 72 years, predominantly men 63%, body mass index 30.3 and comorbidities present 75%. In the first wave, the total number hospitalized was 731 patients, of whom 69% did not require oxygen therapy (OT), 55% were on OT and 9.5% required the use of invasive mechanical ventilation (IMV). In the second wave, the total number of patients was 936, of which 44.5% did not require OT, 78% were on OT and 9.7% required IMV. The third wave numbered 2352 patients, 36.3% were without OT, 87% were on OT and 11.9% required IMV. The fourth wave included 1457 patients, 35.6% were without OT, 67% were on OT, and 5.6% required IMV. The fifth wave affected 2145 patients, 31% of patients were without OT, 70% of patients were on OT, and IMV was used in 9.9% of patients.

Conclusion: The 2 years of the COVID-19 pandemic represent an unprecedented period in medicine, challenging health care systems all around the globe and provoking research activity the likes of which the medical community has never seen before.

Key words: coronavirus disease; COVID-19; respiratory failure; invasive mechanical ventilation

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Quality of Life Among Employees of Serbian Institute of Occupational Health During COVID-19 Pandemic

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Background: During COVID 19 pandemic, health care workers (HCW) are exposed to many workplace stressor beside social isolation and fear from new virus. Many of them report exhaustion and poor general health.

Method: Cross sectional study conducted at Temporary COVID 19 hospital in January 2022 using SF -36 questionnaire for quality of life assessment.

Results: We included 98 employees, 79 workers filled questionnaires, among them 76% were female, 24% male, average age and years of service were 48.1 and 17.9 years respectively. There were 58.2% HCW, 20.3% health associates, administrative workers 13.9% and other staff 7.6%. SF-36 health concepts were analyzed according to engagement in COVID, age, years of service, education, workplace and shift organisation. There were 45.6% workers in COVID hospital, 41.7% on regular jobs, and 12.7% engaged in both. Physical Functioning (PF) and Role Functioning Physical were lower in COVID hospital workers ($p<0.05$), as well as general health and vitality ($p<0.05$). Lower PF ($p<0.05$) and higher bodily pain ($p<0.01$) had workers with lower educational level, as well as older workers with over 20 years of service. All participants had similar scores on the Social Functioning, Role Functioning Emotional and Mental Health scale with no significant difference ($p>0.05$).

Conclusion: In comparison with previous year when all workers had been engaged in Temporary COVID 19 hospital too, almost one third of employees reported worsening or much worsening in general health.

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Comparison of Three Commercial Kits for SARS-CoV-2 RNA Detection

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Background: The detection of Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) early, quickly, and reliably is critical for the successful control of coronavirus disease 2019 (COVID-19). The quantitative real-time reverse transcription-polymerase chain reaction (RT-PCR) assay is considered the gold standard for molecular diagnosis of SARS-CoV-2. The objective of this study was to compare the clinical performances of the three authorized tests – the Abbott Real Time SARS-CoV-2 (ACOV) assay (Abbott Molecular Inc., North Chicago, IL), the GeneFinder™ COVID-19 Plus RealAmp (GeneFinder) Kit (OSANG Healthcare Co., Ltd, Dongan-gu Anyang, Korea) and the Biomerieux ARGENE® SARS-CoV-2 R-GENE® real-time detection (ARGENE) kit (bioMérieux SA., Marcy l'Étoile, France) and to determine whether the selection of targeted genes has an impact on the test's specificity.

Methods: We included 233 nasopharyngeal swabs (NPS) from adult individuals with symptoms or suspected of COVID-19, aged from 18 to 93 years, previously tested by the ACOV and subsequently tested by the GeneFinder and the ARGENE.

Results: We found that the GeneFinder assay detected the most cases of COVID-19 infection, followed by the ACOV assay, and then by ARGENE. Positive agreement ranged from 73.46% to 95.29%, with the strongest level of agreement observed between the GeneFinder and ACOV assays and the lowest agreement between the GeneFinder and ARGENE assay. The negative percent agreement was 100% (GeneFinder/ACOV, GeneFinder/ARGENE, and ACOV/ARGENE), with 3.1% of cases being false-negative using the ACOV test and 17.9% of samples being false-negative using the ARGENE assay to detect SARS-CoV-2.

Conclusions: Due to possible false-negative results using the ACOV and ARGENE tests, we recommend complete testing with the GeneFinder test.

Keywords: COVID-19, SARS-CoV-2; RT-PCR, RNA isolation; Virus detection

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SARS-CoV-2 Infections and COVID-19 Deaths in Novi Pazar Among Vaccinated

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Introduction: Novi Pazar is the third city in the Republic of Serbia to start COVID 19 vaccination on December 26, 2020. The aim of the study is to present the number of vaccinated persons in Novi Pazar by type of vaccine and given dose, the number of tested and positive to SARS CoV-2 and number of COVID 19 deaths among vaccinated.

Material and methods: Retrospective analysis of COVID 19 surveillance data of the Public Health Institute of Novi Pazar was performed from the beginning of the vaccination till the end of 2021.

Results: A total of 68,616 doses of all available vaccines were administered in 2021, 30,482 first, 28,572 two doses while 9,562 third doses. Pfizer-BioNTech was the most common vaccine administered (58%). Among 60,862 tested in 2021, there were 11,325 (11.6%) SARS CoV-2 positive, while 725 (6.4%) positive among vaccinated. Distribution of SARS CoV-2 positivity among vaccinated by type of vaccine was as follows: Pfizer 39,705:220 = 0.6%; Sinopharm 26102:462 = 1.8%; Sputnik V 2352:37 = 1.6%; AstraZeneca 359: 3 = 0.8%; Modern 8: 3 = 37%. The highest monthly number of SARS CoV-2 positive among vaccinated was 270 in September 2021. The number of hospitalized among vaccinated was 36, 5% of the total number of SARS CoV-2 positive. The largest number of hospitalized COVID 19 patients were vaccinated with Sinopharm vaccine 28. The number of COVID 19 deaths among vaccinated was 3, 0.4% of the total number of patients. All COVID 19 deaths were among those vaccinated with Sinopharm vaccine.

Conclusion: Based on the presented data, the protective effect of all types of vaccines is evident.

Key words: COVID-19, Novi Pazar, vaccination, SARS CoV-2 infections among vaccinated; COVID-19 deaths among vaccinated

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Rapid Assessment of the Impact of COVID-19 on Health and Socio-Economic Conditions of Key Populations at Risk of HIV and STIs in Serbia

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Background: The aim of this research was to map out the impact of Covid-19 epidemic on health and wellbeing, health care services and socio-economic conditions of key populations at risk of HIV and STIs.

Method: A cross-sectional study with 240 participants recruited through snow-ball sampling among MSM (men who have sex with men), sexual workers, intravenous drug users (IDU) and people living with HIV (PLWH). The data were collected via closed-ended questionnaire covering socio-demographic characteristics; knowledge, attitudes and behaviours on Covid-19 disease and pandemic; HIV status and testing and counselling services; sexual practices during Covid-19; and general sense of wellbeing during Covid-19.

Results: Low socio-economic status was present in 57% of study participants, while 30% were unemployed during Covid-19. One fourth (23.8%) did not have health insurance. One third (31.3%) had Covid-19 in the previous period, and 7.1% were hospitalised. More than one half (52.1%) were vaccinated. A higher degree of alcohol and drug consumption is recorded during Covid-19, while 52.5% of participants feel socially isolated. Depression is a leading comorbidity among participants (15.0%), while 15.9% are HIV positive and only 1.7% have undetectable viral load status. Majority (82%) consider healthcare services reduced during Covid-19 epidemic, while access to ARV did not change.

Conclusions: Additional efforts are needed to provide better access to health care services for key populations during Covid-19 with particular focus on mental-health services. Focused interventions are needed to improve social inclusion of key populations and to improve their education on healthcare access and social care issues.

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The Importance and Role of Applying Type and Subtype Specific RT-PCR SARS-CoV-2

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Background: On November 26, 2021, the WHO announced a new SARS-CoV-2 variant Omicron, as a variant of concern (VOC). Omicron has three lineages, BA.1, BA.2 and BA.3, which were first detected in November 2021 in South Africa. BA.1 became dominant and has demonstrated substantial escape from neutralizing antibodies induced by vaccination. Aim of study was to show prevalence BA.1 and BA.2 Omicron sub variants in Serbia.

Methods: The study was conducted in February 2022 in the National Laboratory, UCCS. We analyzed 175 nasopharyngeal samples for the presence of SARS-CoV-2 viral RNA with BGI Real-Time Fluorescent RT-PCR Kit (ORFlab gene). For specific detection of BA.1 and BA.2 sub variants we used TIB Molbiol VirSNIP SARS-CoV-2 Spike S371L S373P Kit, a probe based on melting assays, on BioRad CFX96 instrument.

Results: Out of the total tested samples BA.1 Omicron subvariant was found in 136 (136/175; 78%), subvariant BA.2 in 14 (14/175; 8%), and in only 8 (8/175; 4%) was detected SARS spike non Omicron variant. In 12 (12/175; 7%) samples were present mixed SARS-CoV-2 variants. 5 (3%) samples that tested negative on BGI, were negative on BioRad CFX96.

Conclusions: All variants of COVID-19 can cause severe disease or death, especially for most vulnerable people, and there is significance of monitoring, detecting existing and new mutations of SARS-COV-2. Our results present that BA.1 and BA.2 Omicron sub variants are dominant in our testing group and can be useful for surveillance of the SARS-CoV-2 epidemic in Serbia.

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COVID-19 in Health-Care Workers – a Single-Center Study

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Background: The COVID-19 pandemic put health-care workers (HCW) at a higher risk of being infected, compromising the workforce during a time of increased demand. There is still a scarcity of data on HCW and the risk of COVID-19. The aim was to assess the risk of infection among HCW involved in care of COVID-19 patients.

Methods: From March 2020 to February 2022, the study examined the medical records of 1636 COVID ZUMC, Belgrade employees (332 doctors/D/, 974 nurses and technicians/NT/, compared to 330 nonmedical workers/NMW/).

Results: Overall, 918 (56.11%)-176 D, 595 NT, 147 NMW (53.01%, 61.08%, and 44.54% respectively)-had confirmed and symptomatic COVID-19, 43 required hospitalization, 2 ICU with fatal outcome (1D, 1NT). 64 asymptomatic employees (3.91%) had positive routine IgG tests. Mar-Dec 2020, 420 (25.67%) was positive (362 HCW, 58 NMW, 27.71%, 17.58%, $p = 0.01$); Jan-Dec 2021, 192 (11.74%), 153HCW, 39 NMW, 11.71%, 11.82%, respectively; Jan-Feb 2022, 306 (18.70%), 60D, 196NT, 50 NMW, 18.07%, 20.12%, 15.15%, respectively. Reinfection occurred in 8 cases. 1393 employees (85.15%) have been vaccinated, 305 (91.87%) D, 778 (79.88%) NT, and 310 (93.93%) NMW. Daily absenteeism due to COVID-19 illness varied from 0 in Mar 2020 to a maximum of 137 (8.37%) employees in Feb 2022.

Conclusions: HCWs were at a higher risk of getting infected before vaccines were available. In 2021, a high vaccination rate among employees of 85.15% reduced infection by 2.19 times. Omicron variant predominance in Jan-Feb 2022 led again to a significant rise regardless of vaccinal status.

Key words: health-care workers' infection, vaccination, COVID-19

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Severity of Covid-19 Symptoms Among University of Belgrade Students During the July-September 2021 Epidemic Wave: Implications for Vaccination

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Background: Immunisation helps to prevent the severe outcomes of COVID-19. The aim of this study was to identify the intensity of COVID-19 symptoms during the on-going epidemic wave (July-September 2021) and explore factors associated with having moderate and severe symptoms of COVID-19 in the population of the affected students from the University of Belgrade.

Methods: This study was carried out at the Institute for Students' Health (ISH) in Belgrade, Serbia. The ISH is the referral institution for health care delivery at primary and secondary levels. This analysis includes the students who presented in ISH from July 1 until September 30, 2021, when the latest epidemic wave of COVID-19 was observed among university students. Data were extracted from students' electronic medical records. Three levels of COVID-19 symptom intensity were defined: mild, moderate and severe.

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Results: Of students seeking medical care at the ISH who were diagnosed with COVID-19, 27.3% had mild disease and the majority, 59.3%, had moderate disease. A total of 13.4% had severe symptoms. Of all students, 124 (21.8%) were fully vaccinated (with 2 doses) with either Sinopharm (81, 60.9%), Pfizer-BioNTech (38, 28.6%), Sputnik V (7, 5.3%) or Oxford-AstraZeneca (7, 5.3%). The multiple multinomial regression model suggests that students who were vaccinated against COVID-19 were 78% less likely to develop moderate symptoms and 96% less likely to develop severe symptoms of COVID-19.

Conclusion: Students who were vaccinated against COVID-19 are at lower risk of developing moderate and severe symptoms of the disease.

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Establishment and Validation of Tib Molbiol Virsnip SARS-CoV-2 Spike S371l S373p Test for Detection of Omicron Variant in Patients from University Clinical Center of Serbia – „Fire Eye“ Laboratory

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Background: The novel Omicron variant of SARS-CoV-2 virus, which has been in the center of attention since November 2021, was detected in Serbia in December 2021. In this study, VirSNiP Spike test, the probe-based melting curve assay for Omicron identification, was introduced and evaluated at the National Laboratory „Fire Eye“, University Clinical Center of Serbia.

Methods: We analyzed 175 nasopharyngeal swabs during February 2022. Firstly, they were analyzed with the BGI RT-PCR Kit, in order to select positive SARS-CoV-2 samples for variant identification and negative samples for confirmation of specificity. According to manufacturer's instructions, the following probe melting temperatures (T_m) correspond to the studied variants: $62 \pm 2^\circ\text{C}$ – Omicron BA.1, $53.5 \pm 2^\circ\text{C}$ – Omicron BA.2 and $45 \pm 2^\circ\text{C}$ – non-Omicron variants. Reproducibility of the test was evaluated by testing of positive and negative samples in duplicate. The sensitivity of the test with regard to non-Omicron variants was examined on SARS-CoV-2 positive samples which predate the emergence of Omicron.

Results: A total of 158 positive samples were analyzed: 136 (86.08%) were determined to be Omicron BA.1, 14 (8.86%) Omicron BA.2 and 8 (5.06%) non-Omicron SARS-CoV-2 samples; 100% of negative samples and blank controls tested negative. Duplicate samples gave consistent results and 100% of older positive samples were determined to be SARS-CoV-2 positive non-Omicron. None of the tested samples had T_m values outside specified ranges.

Conclusion: The VirSNiP Spike test is routinely adapted and reliable for determining Omicron variants in Serbia.

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Evaluation of Implemented Measures in Long-term Care Institutions, Banja Luka Republic of Srpska, March-July 2020.

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Background: The first case of COVID-19 in the Republic of Srpska was confirmed on March 5, 2020. in Banja Luka, and during the next 18 surveillance weeks it was confirmed 870 cases. Based on the available information at the beginning of the pandemic, we identified long term care institutions (LTC) as places of increased risk for the occurrence and spread of COVID-19. Without special legislation for LTC, but with our previous experience in sanitary and hygienic controls of these institutions, we assume their limit to the possibility of dealing with instructions and preventive measures. Searching for the best solution for the organization of health care and everyday life in LTC in conditions of isolation, we created the Intervention that was introduced in early April 2020.

The intervention was based on general measures of prevention and included the formation of a multidisciplinary team, channels and rules of communication, work instructions, etc.

The aim of this paper is to evaluate the measures implemented by the intervention in the LTC in the period March-July 2020.

Methods: Descriptive study

Results: The cumulative incidence of the confirmed COVID-19 case was 483/100000. The incidence in LTC, among staff was 1.6/100 and 0.61/100 inhabitants, in the general population the incidence at age > 65 years was 0.65 /100 inhabitants. The age mortality rate was 0.20% in the general population and 0.25% in LTC.

Conclusions: Resilience to emergencies in the LTC should primarily be based on capacities and capabilities to implement general prevention measures.

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Influence of Vaccination and Hygienical and Epidemiological Measures on Patient Mortality Reduction in the Gerontology Center Sabac

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Background: The epidemic of COVID-19 was reported in the Gerontology Center in Sabac on January 9th 2021. First cases were recorded on January 4th, 2021. Unique characteristics of these cases were that, on December 31st 2020, 156 out of 210 beneficiaries of the Center were vaccinated with the first dose of Pfizer Biontech vaccine. The beneficiaries were accommodated in two facilities: Stationary 57 and the New Facility 154. The epidemic took place only in the New Facility, while the quarantine was conducted in the Stationary for employees and beneficiaries. The entire New Facility was transformed into a red zone i.e. temporary hospital.

Methods: Descriptive study

Results: During the epidemic 125 out of a total of 153 beneficiaries got ill in the New Facility. Morbidity was 81.7%, 98 (83%) beneficiaries out of a total of 118 vaccinated in the New Facility got ill, and 27 out of 35 unvaccinated (77.1%) got ill. A total of 33 beneficiaries with a severe form of the disease were hospitalized, 25 of which were vaccinated (25.5% of patients), and 8 (29.6%) were hospitalized with the unvaccinated patients.

Percentage of deaths from COVID-19 among beneficiaries was 14.3% in the population vaccinated with the first dose of vaccine (14/98), whereas the percentage of deaths among the unvaccinated beneficiaries was 29.6% (8/27).

Conclusion: Reduced percent of deaths has been observed despite the short period of time from the first dose. Completely implemented hygienic and epidemiological measures prevented the occurrence of the disease in the significant population of beneficiaries of the Gerontology Center.

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Comparison of Two Commercial RT-PCR Diagnostics Kits for COVID-19, in Department of Medical Microbiology, University Clinical Center of Serbia

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Background: Throughout the COVID-19 pandemic, the rapid identification of the virus was essential for quick recognition of positive cases. The aim of this study was to compare the results obtained with the simultaneous use of two commercial real-time (RT) PCR kits.

Methods: In the study period from March to April 2021, in the Department of Medical Microbiology (the National Laboratory "Fire Eye" and Service for Virology), University Clinical Center of Serbia, 176 nasopharyngeal swabs were analyzed. We used the following commercial kits at the same time: BGI RT-PCR for detecting SARS-CoV-2 (present ORF1a gene) and the GeneFinder™ COVID-19 PLUS RealAmp kit (present N, E and RdRp genes). Samples were divided into two groups: I-147 initial tested samples and II-29 samples that were positive for more than 14 days. To analyze the results obtained we used the Cohen's kappa coefficient (k).

Results: In the first group, 60 (40.8%) samples were positive on BGI, and 83 (56.5%) on GeneFinder™. In the second group, no sample was positive on BGI while 18 (62.8%) samples were positive on GeneFinder™. In all of them, only the N gene was present, with cut-off values threshold (Ct) from 36 to 40. In the first group, two tests showed significant agreement ($k = 0.7$), while in the second group, there is no agreement ($k = -0.001$).

Conclusion: Both RT-PCRs showed significant agreement in active COVID-19. After 14 days, only the N gene was detected, indicating a prolonged infection.

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Protective Role of IFNL3 and IFNL4 Polymorphism in Woman Against COVID-19-Related Pneumonia

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Background: IFN- λ s are the primary interferons induced in pneumocytes to limit the initial infection in the upper airways. The role of IFNL genes, and close association with infectious disease outcomes may be significant in COVID-19. Our aim is to determine the importance of common IFNL3 and IFNL4 variants for development of COVID-19-related pneumonia.

Methods: This observational case-control study included 178 patients hospitalized at University Clinical Center Kragujevac, Serbia with laboratory-confirmed COVID-19. Ready-to-order TaqMan assays were used for genotyping analysis of single nucleotide polymorphisms at the IFNL3(rs8099917 and rs12980275) and IFNL4(rs12979860 and rs368234815) loci.

Results: The study included 30(18 women) patients without and 148(54 women) patients with pneumonia. Increase in Charlson Comorbidity Score (CCI) and neutrophil-to-lymphocytes ratio (NLR) was associated with higher odds of COVID-19-related pneumonia. The presence of at least one IFNL4 rs12979860 and rs368234815 variant allele, also an IFNL3 rs12980275 variant allele, substantially decreases the odds of developing COVID-19-related pneumonia in women, with a more pronounced reduction in homozygous variant carriers. The odds reduction was observed in IFNL3 rs8099917 two variant allele carriers. Multivariate regression confirmed the observed pattern in the presence of IFNL4 rs12979860 and rs368234815, IFNL3

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rs8099917 homozygous variant carriers, and IFNL3 rs12980275 single allele carrier in combination with CCI and NLR. Association of IFNL3 and IFNL4 with pneumonia risk was not detected in men.

Conclusion: Our study suggests the protective role of variant alleles of tested IFNL3 and IFNL4 polymorphisms in COVID-19-related pneumonia in women, whereas existing comorbidities and neutrophil-to-lymphocytes disbalance are indicators of worsening of disease clinical course.

Effectiveness of Four Different COVID-19 Vaccines Against Alpha Strain: a Retrospective Comparative Cohort Study Based on a Real-World Data From Serbia

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Tijana Veljkovic³, Dejan Baskic^{4,5}

Background: Reports on COVID-19 vaccination efficacy (VE) are often confined to certain vaccines, countries, and populations. The main objective of the research was to evaluate the VE of BBIBP-CorV, Gam-COVID-Vac, BNT162b2, and ChAdOx1-nCoV-19 in Serbia.

Methods: Using data from the Serbian National Immunization Registry, Primary Health Center Report, and University Clinical Center Report for Kragujevac (Serbia), from January 1st to May 3rd 2021, we compared COVID-19 vaccinated population to unvaccinated individuals in terms of laboratory confirmed SARS-CoV-2 infection, COVID-19-related hospitalization, and ICU admission. VE was estimated based on the incidence rate ratio, adjusted for age and sex.

Results: The study included 38,454 vaccinated (25,977 with 2 doses) and 76,908 unvaccinated subjects. For SARS-CoV-2 infection, COVID-19-related hospitalization, and ICU admission, the overall VE after the first dose was 20.6%, 28.2%, and 56.1%, respectively. The second dose increased VE against all outcomes during the six-weeks-long follow up to 55.7%, 63.9% and 79.8%, respectively. BNT162b2 showed 96.7% VE against infection, with no hospitalization case after the second dose. Com-

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plete vaccination with BBIBP-CorV and Gam-COVID-Vac demonstrated VE of 43.2% and 78.6% against infection, 56.9% and 85.3% against hospitalization, and 82.3% and 52.7% against ICU admission, respectively. ChAdOx1-nCoV-19 after the first received dose showed VE of 10.3% and 74.7% against infection and hospitalization, with no ICU admission.

Conclusion: SARS-CoV-2 infection, hospitalization due to COVID-19, and ICU admission significantly decreased with COVID-19 vaccination. Substantial improvement in vaccine effectiveness was observed for all study outcomes when the second dose is administered.

Three Episodes of COVID-19 in a Nursing Home in Belgrade, Serbia

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Background: Over the two years of the COVID-19 pandemic, the elderly in nursing homes (NH) have been hit particularly hard.

Methods: We conducted a retrospective study of 3 episodes of COVID-19 in one NH in suburban Belgrade, Serbia, at the time of pre-alpha (Nov 2020), delta (Nov 2021) and omicron (Jan 2022) variants of SARS-CoV-2. All staff and 95% of residents were vaccinated in the early spring of 2021, with BBIBP-CorV, Gam-COVID-Vac and BNT162b2 vaccines. COVID-19 was diagnosed by positive PCR and/or antigen test. Specific IgG antibodies against SARS-CoV-2 S glycoprotein RBD were assessed by ELISA.

Results: The 3 episodes involved a total of 188 infections. The first involved 65/126 (51.9%) residents and 44/64 (68.7%) staff, the second 22/75 (29.3%) residents and 3/40 (7.5%) staff, and the third 36/110 (32.7%) residents and 18/56 (32.1%) staff. Clinical presentation ranged from asymptomatic to severe, with severe cases being referred to hospital ICUs. Mortality per episode was 19.8%, 2.7% and 0%, respectively, and involved residents only. After the first episode, all 36 examined residents and 43 of the 44 staff had specific antibodies. Interestingly, higher levels (20.45 ± 13.27) were detected in the residents than in the staff (9.74 ± 9.52) ($p < 0.001$) despite a double difference in age (79.6 ± 7.48 vs. 40.8 ± 11.43) ($p < 0.001$). Episodes 2 and 3 involved 4 (1 resident, 3 staff) and 22 (13 residents, 9 staff) breakthrough infections.

Conclusions: Elderly individuals mounted a good immunological response to the vaccines, which prevented significant mortality in the next episodes, despite a significant number of omicron-induced breakthrough infections.

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Gender Difference in SARS-CoV-2 Stimulation of Hyperinflammatory Response in Patients with COVID-19

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Background: Although women and men have the same prevalence, men with COVID-19 are more at risk for worse outcomes and death, independent of age.

Methods: To observe the hyperinflammatory response regarding sex, we will measure the levels of inflammatory cytokines: interleukin-6 (IL-6), IL-1 β , tumor necrosis factor-alpha (TNF- α), monocyte chemoattractant protein-1 (MCP-1), IL-10, interferon-gamma (IFN- γ), IL-8, transforming growth factor-beta 1 (TGF- β 1), analyzed by ELISA, in plasma of 130 COVID-19 patients at diagnosis and correlate them with clinical parameters. Besides, we checked the quality of life of patients up to 3 months after hospitalization.

Results: Pro-inflammatory IL-6 was significantly ($p < 0.01$) increased in male COVID-19 patients compared to healthy male volunteers (4.7-fold) and female COVID-19 patients (1.75-fold). IL-6 was positively correlated to INR, aPTT ($p < 0.001$), and ferritin ($p < 0.05$), while INR with CRP ($p < 0.05$). IL-8 was significantly increased in female COVID-19 patients compared to healthy female volunteers ($p < 0.01$, 2.5-fold) and male COVID-19 patients ($p < 0.05$). TNF- α was significantly ($p < 0.05$) increased in male COVID-19 patients compared to healthy male volunteers. MCP-1 and IFN- γ were significantly increased in female COVID-19 patients compared to healthy female volunteers ($p < 0.01$). Anti-inflammatory TGF- β 1 was decreased in COVID-19 patients regardless of gender. Most patients were men (75%) with chronic disorders (59%, mostly hypertension). COVID-19 reduced their social (32%) and physical activities (34%) after 6 weeks of diagnosis, but further on reduced in additional 3 months (social 55%) with depression (22%).

Conclusions: Inflammatory response is generally increased in COVID-19 patients with specific cytokines in accordance with gender.

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Laboratory Practices to Mitigate Biohazard Risks During the COVID-19 Pandemic

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Background: COVID-19 rapidly spreading global pandemic with increased burden on healthcare. It is especially hazardous to healthcare personnel, including laboratory professionals who must continue their work to support patient care. Except the well-known transmission pathways by respiratory droplets, as well as from contaminated hands and surfaces, laboratory personnel can potentially come into contact with SARS-CoV-2 genetic material that may be present in various types of clinical specimens. Laboratory should perform a site- and activity-specific risk assessment of the laboratory to identify and mitigate risks is key. The aim of this presentation is to provide a set of recommendations on biosafety measures for routine clinical chemistry laboratories that operate at biosafety levels ≤ 2 .

Methods: Overview of the current literature pertaining guidelines and recommendation on laboratory biosafety (including point-of-care testing) international health agencies (WHO, CDC, IFCC), national recommendation, observational studies or extrapolations from what has been learned during earlier epidemics caused by the SARS and MERS coronaviruses, resources for conducting a laboratory risk assessment and defining weak points in laboratory processes (CLSI M29A4, CLSI EP23).

Results: This presentation addresses the personal hygiene and personal protective equipment, generic biosafety measures, handling routine patients' specimens pre-analytical, analytical and post-analytical processes, and decontamination of laboratory equipment and surfaces to mitigate biohazard risks in laboratories during COVID-19 pandemic.

Conclusions: It is important to promote biosafety protective measures and awareness among laboratory personnel, decreasing the risk of professionally acquired infections and supporting the preparation of the staff for managing this and other similar outbreaks in the future.

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Risk Assessment Applied to Routine Laboratory Analysis in Covid Hospital: Focus on Urinalysis

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Background: Clinical laboratories and laboratory personnel play a significant role in the global fight against COVID-19 pandemic and are faced with a lot of operational challenges. Because of biohazard concerns, some facilities were forced to limit laboratory test availability such as urinalysis. In laboratories, a risk assessment approach is the backbone of its biosafety. The clinicians in our COVID-19 hospital expected a complete urinalysis result. The aim of this study was to evaluate the biosafety risk in a clinical-biochemical laboratory where the routine urinalysis of COVID-19 patients is performed, and to suggest risk control measures that could be put in place.

Methods: Risk assessment for complete urinalysis was performed in December 2021, using the risk assessment template published in WHO interim guidance "Laboratory biosafety guidance related to coronavirus disease (COVID-19)."

Results: The overall initial risk for complete urinalysis test was determined to be very high, indicating discontinuation of manual microscopic urinalysis process. To reduce the risk, surgical masks, surgical caps, eye protection, and disposable laboratory coats were added to the previously mandated personal protective equipment. After implementing additional risk control measures, the total residual risk of the process was graded medium. With the further action-implementation of urinalysis automation, laboratory management succeeded in falling the risk below the risk tolerance level with existing risk control measures in place.

Conclusions: Since there was no effective treatment for COVID-19 in the period of opening COVID-19 hospital, exposure risk was considered severe. Measures that were initially put in place reduced the total residual risk.

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Reliability of a Rapid Antigen Test in Relation to Molecular Diagnosis of SARS-CoV-2 in "Fire Eye" Laboratory in Belgrade

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Background: A prompt diagnosis is crucial for appropriate treatment of COVID-19. Reliability assessment of one commercial rapid antigen-diagnostic test (Ag-RDT) was compared with routinely adapted real-time PCR (RT-PCR) from nasopharyngeal swabs in the diagnosis of SARS-CoV-2.

Methods: The study group included randomly selected 288 individuals [226 from the University Clinical Center of Serbia (UCCS) and 62 outside UCCS], with epidemiological and/or clinical suspicion of COVID-19 who were tested on the same day using point-of-care Ag-RDT (Abbott's Panbio™) and RT-PCR test for SARS-CoV-2 from January 2021 to February 2022. Laboratory diagnosis of COVID-19 was confirmed with BGI RT-PCR in National Laboratory "Fire Eye", UCCS. Both tests were performed and interpreted according to the manufacturer's instructions. Sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of Ag-RDT were calculated using RT-PCR as a reference method. The effect of viral load (cycle threshold, Ct) of RT-PCR (<25, 25-30, >35) on Ag-RDT susceptibility was analyzed.

Results: Patients were predominantly women (50.69%). The mean age was 43.04 ± 19.63 (from two months to 90 years). PCR was positive in 136 (47.2%) tested patients. The mean Ct was 24.37 ± 6.731 (range 12.35 - 36.98). Ag-RDT was positive in 42 patients with positive PCR. Ag-RDT showed 30.15% sensitivity, 99.34% specificity, 97.62% PPV and 61.38% NPV, respectively. Sensitivity of Ag-RDT depended on viral load and it was the highest with a Ct<25.

Conclusion: The Ag-RDT we used has high specificity and low sensitivity, so negative results require confirmation with RT-PCR.

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COVID-19 and Laboratory Accreditation: Experience From a Tertiary Care Centre

Tatjana Vodnik¹, Sanja Stankovic¹

Background: The accreditation process proved to be extremely important even during the COVID-19 pandemic, because standards are an integral part of patient safety, quality and health care. The aim of this study is to highlight the impact of COVID-19 pandemic on laboratory accreditation from the perspective of Centre for Medical Biochemistry University Clinical Centre of Serbia (CMB UCCS)-the first accredited medical laboratory in Serbia.

Methods: The method applied in this paper is a combined description of an overview of the standard and the activities carried out in the field, using the example of the CMB UCCS.

Results: At the time of the beginning of the COVID-19 pandemic, CMB UCCS has a flexible scope of accreditation, for more than 350 tests. During the pandemic, the scope of accreditation was successfully maintained and expanded. The existing CMB UCCS Risk Management Plan was amended with the strategies to manage and reduce the risks related to the transmission of COVID-19. Throughout the pandemic, CMB UCCS participated successfully in 10 different Proficiency Testing programs for all areas of examination. Also, CMB UCCS was checked 4 times (virtual or on-site survey) by the control organisations, who confirmed our competency and preparedness for pandemic.

Conclusions: Our robust, accredited, Quality Management System ensured that we have been prepared to adapt quickly and safely to this comprehensive situation in COVID-19 pandemic. It ensured timely and quality delivered service that prioritises the safety of patients and laboratory personnel, met the needs of our customers and complied with requirements of relevant Quality Standards.

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COVID-19 - a Challenge for the Laboratory System

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Background: COVID-19 is a global health problem of pandemic proportions, with significant medical, social and economic consequences worldwide. It poses a major challenge to the healthcare system, clinicians and clinical laboratories. The aim of this paper is to present the hematological and biochemical parameters used in the diagnosis of COVID-19 and to point out the importance of their establishment among patients with severe clinical picture and complicated course of the disease.

Methods: We conducted a literature search through Pubmed, Scopus, and Google Scholar for relevant articles on the role of biomarkers in COVID 19.

Results: The analysis and discussion of the searched literature led to conclusions about the importance of biomarkers.

Conclusion: Establishing laboratory biomarkers in patients infected with SARS-CoV-2 virus is important in: categorization of patients, identification of high-risk patients and their referral to intensive care units, monitoring the course of the disease, monitoring the effects of applied therapy, as well as the prognosis of the outcome of the disease.

Key words: COVID-19, Sars-CoV-2, biomarkers, laboratory diagnostics

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Biomarkers in the Laboratory Diagnosis of Invasive Fungal Infections - Results For Patients Treated in Covid Hospital Batajnica

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Background: During the COVID-19 pandemic, secondary infections are a common complication. Rapid detection of fungal infections has major importance for prognosis and survival.

Methods: In this retrospective study 517 different mycological analyses from 78 patients hospitalized in Covid Hospital Batajnica (Belgrade, Serbia) were presented. All mycological tests were performed in the Department of Medical Microbiology, University Clinical Center of Serbia from December 2020 to February 2022. Patients' median age was 62.4±14.10 years (range 21-91) and 65% were men. Following serological tests were performed: for 57 samples (1,3)-β-D-glucan (FUJIFILM), 92 Aspergillus galactomannan Antigen (Dynamiker), 156 Anti Aspergillus IgM and IgG (TECAN), 78 Candida mannan Antigen (Dynamiker) and 134 Anti Candida IgM and IgG (NovaLissa), respectively.

Results: Out of 48 tested patients, 13 (27.08%) had positive (1,3)-β-D-glucan antigen (values 8.00-462.30 pg/ml). Three of those patients had positive results for galactomannan, two for mannan antigen and one had positive both antigens. Patients with positive (1,3)-β-D-glucan and high values of galactomannan or mannan antigen or Anti Aspergillus and Candida antibodies, had no significant mycological findings in other samples (blood, urine, sputum, BAL). Positive galactomannan antigen, Anti-Aspergillus IgM and IgG antibodies, was found in (12/78) 15.38%, (21/68) 30.88% and (40/68) 58.82% patients, respectively. Mannan antigen was detected in (14/65) 21.53%, but anti-Candida IgM and IgG antibodies were not detected in any of the tested sera.

Conclusions: Our results indicate the need to apply several methods (biomarkers), repeated testing and a multidisciplinary approach to confirmation of invasive fungal infections especially in COVID-19 hospitalized patients.

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Analysis of SARS-CoV-2 Testing Results in University Clinical Center of Serbia

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Background: At the beginning of the SARS-CoV-2 epidemic in Serbia, a prompt laboratory reorganization was made in the Department of Medical Microbiology, University Clinical Center of Serbia (UCCS). SARS-COV-2 diagnostics were introduced at the Virology Laboratory, and molecular mass testing began with the formation of the "Fire Eye" National Laboratory.

Method: This study is conducted between March 2020 and February 2022. We performed real-time PCR (RT-PCR) of 493.080 nasopharyngeal (NP) swabs, and four protocols: Ingenius/GeneFinder (n=286), ABI7500/PrimeDesign (n=351), Abbott (n=786), BGI (n=489.734). Nasopharyngeal swabs (n=75.807) were used for Abbott's Panbio rapid antigen-diagnostic test (Ag-RDT). IgG and IgM antibodies were detected using an immunochromatographic test (Vazyme, n=37.336).

Results: RT-PCR tests were positive in 126.203 (25.59%) samples. The number of performed and positive results varied, with peaks in July 2020 (n=48.748; positive 30.59%), and November 2020 (n=54.823; 42.96%), March 2021 (n=30.379; 32.51%), October 2021 (n=24.769; 30.46%) and January 2022 (n=29.551; 44.36). Among Ag-RDT, 9.94% were positive. In UCCS, the most Ag-RDT were done in the Emergency Center (n=29.025; 5.92%), while the Clinic for Infectious and Tropical Diseases had the most positive tests (n=7.429; 38.2%). The rates of positive IgM and IgG were (n=3.187; 8.54%), (n= 5.079; 14.84%), respectively.

Conclusion: Introduced tests and methods indicate the successful reorganization of the Department of Medical Microbiology of the UCCS during the COVID 19 pandemic and highlight benefits for the patients both before, during and after the infection.

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Examination of COVID-19 Epidemic Related Stress in the General Population of Republic of Serbia and Republic of Srpska

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Objective: Study aimed to investigate COVID-19-related distress in the Republic of Serbia and Republic of Srpska.

Methods: Data were collected from September to December 2020 among the general population of four cities in Republic of Serbia and Republic of Srpska, countries where the Serbian language is spoken. Participants completed a socio-demographic questionnaire, followed by the COVID Stress Scale (CSS).

Results: Study included 961 persons (79.1% from Republic of Serbia and 20.9% from Republic of Srpska). Participants were males in 52.8% and females in 47.2%, with an average age of 38.18 +/- 14.11 years (range 18 to 90 years). Most participants had secondary education (54.1%) and were employed (65.4%). The average total CSS in our sample was 35.36 +/- 25.87. Out of all CSS domains the highest average score was obtained for Danger (9.69 +/- 5.56) and the lowest for Traumatic Stress Symptoms (3.333 +/- 4.82). Participants from the Republic of Serbia had significantly higher average Total CSS scores than those from the Republic of Srpska (36.23 +/- 27.11 vs. 32.06 +/- 20.23; $p=0.042$). There were no differences regarding participants residence country in Socio-economic Consequences ($p=0.902$) and Compulsive Checking and Reassurance Seeking ($p=0.121$) domains, while for all other CSS domains participants from Republic of Serbia had significantly higher scores than those living in Republic of Srpska.

Conclusions: COVID-19 generally caused low distress for people from the Republic of Serbia and Republic of Srpska. Still, distress was somewhat more pronounced for people in the Republic of Serbia.

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COVID-19 Related Health Behaviors

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Objective: Study aimed to investigate COVID-19 related risky behaviors in the Republic of Serbia.

Methods: Data were collected through a thorough socio-demographic questionnaire that was distributed from September to December 2020 among the general population of three cities in the Republic of Serbia (Belgrade, Kragujevac and Kosovska Mitrovica).

Results: Study included 760 participants (56.6% male and 43.4% female) with average age of 38.81 +/- 13.64 years (range 18 to 90 years). Most participants had secondary education (53.7%) and were employed (73.3%). To get informed about COVID-19 participants mostly used nonmedical sources (media, internet, friends, etc; 58.7%). Participants reported visiting places with potentially increased risk of infection in 55.8% (cafes 50.1%; restaurants and cosmetic salons in 37%; night clubs / gyms / pools in less than 20%). Participants wore face masks always in 30%, in crowds 2.5% and only indoors in 38%, while 9.3% did not use it for COVID-19 prevention. Using face masks was associated only with going to risky places ($p=0.001$). Younger ($p=0.006$) and employed ($p=0.005$) participants most commonly reported attending risky places. Health-related behaviors were not influenced by other assessed socio-demographic parameters or COVID-19 information sources.

Conclusions: People in the Republic of Serbia mostly acted responsibly and did not practice COVID-19 related risky health behaviors. Younger and employed persons visited cafes, but wore face masks indoors.

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Increase of *Clostridioides Difficile* Infections Ratio in the Second Year of COVID-19 at the University Clinical Center of Serbia

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Background: *Clostridioides difficile* (CD) infections are a significant burden of health-care systems all over the world.

Methods: All stools from patients of the University Clinical Center of Serbia suspicious for CD infection are tested at the Department of Medical Microbiology, Bacteriology laboratory at Clinic for Infectious and Tropical Diseases. From December 2020 part of that clinical center was "COVID" Hospital Batajnica. All stools for *C. difficile* investigation were tested on glutamate dehydrogenase (GDH). GDH positive stools were searched for toxins A and B, and the culture of CD was performed. Starting from June 2021, 191 GDH positive stools were tested by PCR test, which indicated the detection of toxigenic strain.

Results: Out of 1585 stools tested in 2021, 50.8% were GDH-positive. Compared to the ratio of positive results in the previous 5 years (36.2% on average), it was a significant increase ($p < 0.00001$). Patient's median age was 71, and 132 (69.1%) of them were more than 65 years old. Out of 191 GDH positive stools from the subgroup, 65 (34.0%) were toxin A positive and 67 (35.1%) were toxin B positive. From 188 (98.4%) of them was obtained a growth of CD and PCR test detected toxigenic strain of the bacterium in 186 (97.4%) specimens.

Conclusions: In 2021, when COVID-19 epidemic was in full swing, a significant increase of CD infections was noted. The majority of GDH positive stools contained toxigenic strains.

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Frequency of Bacterial Isolates Obtained from the Blood Cultures of Patients Treated in Covid Hospital "Batajnica" in 2021

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Background: The Department of Microbiology, Bacteriology laboratory at Clinic for Infectious and Tropical Diseases received samples for bacteriological analyzes from COVID hospital "Batajnica" from January to December 2021. Blood culture samples were the most numerous in relation to urine and stool samples, throat, nose and wound swabs.

Methods: Blood samples were collected in special purpose vials made for Bactec Automated Blood Culture System. Antimicrobial susceptibility of isolated microorganisms was tested by disk diffusion method. The results were interpreted according to the European Committee on Antimicrobial Susceptibility Testing – EUCAST. For statistics we used LabIS, software proposed for everyday work in the laboratory.

Results: Out of a total of 4646 samples, 2168 (46.7%) were positive, while 2478 were sterile. Among positive samples, single isolate was present in 1656 cases (76.4%), while mixed culture was detected 512 times. The most commonly isolated microorganisms were *Staphylococcus coagulase negative* - mostly isolated as conditional pathogen (30.56%), followed by *Acinetobacter* spp. (25.02%), *Klebsiella* spp. (16.39%) and *Enterococcus* spp. (14.68%). When it comes to antimicrobial susceptibility, *Acinetobacter* spp. was sensitive in most cases only to Colistin, while *Klebsiella* spp. was sensitive to Chloramphenicol, Colistin and Ceftazidime-avibactam. *Enterococcus* spp. was sensitive almost exclusively to Linezolid and Tigecycline.

Conclusion: The number of positive samples followed the dynamics of COVID-19 during 2021, with the highest frequency during early spring and winter months. Our results show that the disease was accompanied by highly multidrug-resistant microorganisms, which was certainly another challenge in the treatment of patients with COVID-19.

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Adverse Events Following COVID-19 Immunisation Reported by Healthcare Workers in Serbia

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Background: Rare or serious vaccine-associated adverse events following immunisation (AEFI) may not be identified in clinical trials, so post-marketing AEFI surveillance is essential to ensure COVID-19 vaccines safety.

Methods: Descriptive analysis of adverse events following administration of five different COVID-19 vaccines, spontaneously reported by healthcare workers in Serbia, between December 24th 2020 and December 31st 2021, was performed.

Results: Total number of AEFI reports was 645 (reporting rate 8.2/100,000 administered doses). Reporting rates by vaccines per 100,000 doses were 29.9 for mRNA-1273, 20.0 for ChAdOx1 nCoV-19, 15.3 for Gam-COVID-Vac, 9.6 for BNT162b2 and 5.7 for BIBP-CorV vaccine. Number of reported AEFIs that met serious AEFI definition was 52 (8.1% of reported AEFIs). After causality assessment, performed by National AEFI Committee for 49 serious AEFIs so far, 18 serious AEFIs were classified as vaccine product-related reactions, one as immunisation anxiety-related reaction, 14 as indeterminate and 16 as coincidental events. Except allergic reactions, manifested as angioedema and/or generalised urticaria, serious vaccine product-related reactions included two cases of GBS, two cases of pericarditis and one case of myocarditis after BNT162b2 vaccine, three cases of pulmonary thromboembolism as well as one case of thrombocytopenia after ChAdOx1 nCoV-19 vaccine and one case of neurological symptoms relapse after Gam-COVID-Vac vaccine.

Conclusion: AEFI surveillance system in Serbia has shown sensitivity to detect rare serious AEFIs and provided evidence of COVID-19 vaccines safety. However, expected and mild adverse events are underreported. Future initiatives to improve awareness of healthcare workers on the importance of AEFI surveillance are needed.

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COVID-19 Testing at the University Clinical Center of Serbia

Nataša Mazić¹

Background: SARS CoV-2 testing is of the utmost importance not only for diagnosis of COVID-19 but also for implementation of infection control measures. In our hospital testing criteria are determined according to the national testing guidelines. Since COVID-19 testing state of the art was evolving during pandemic testing methods and protocols were periodically changed.

Methods: Healthcare personnel from the Department of Hospital Epidemiology are performing nasopharyngeal and oropharyngeal swabs from patients and employees of the University Clinical Center of Serbia as well as domestic and foreign citizens on their personal request. Health care workers with signs and symptoms of COVID-19 are being tested in facilities separated from main buildings. RT PCR and rapid antigen tests are used to diagnose COVID-19. Current testing protocols limit the use of SARS-CoV-2 antibody tests. People that are tested could be symptomatic or asymptomatic. In some cases tests are repeated. Integrated data for flu and SARS-CoV-2 are collected in sentinel surveillance organized by the Institute of Public Health of Serbia.

Results: Between 30 03 2020 and 31 01 2022, the Department of Hospital Epidemiology has taken 59623 samples for COVID 19 diagnostic tests. Of that number 32 841 were RT PCR tests and 26 782 were antigen tests. Number of positive cases varied according to the epidemic waves. Cases of co-infections of flu and SARS CoV2 were not detected.

Conclusions: In order to adequately implement the proposed testing strategy it is necessary to have sufficient testing resources, well trained staff in addition to professional organization at every level.

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COVID-19 Risk Perception and Health Literacy Among Serbian Adults

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Background: For appropriate risk communication planning, regular monitoring of trust, attitudes and perceptions is of great importance.

Methods: Cross sectional survey conducted using survey tool made available by WHO/Europe, implemented in six waves from December 2020 to August 2021, by the team composed of representatives of Institute of Public Health of Serbia, Ministry of Health of Serbia, WHO Country Office supported by the Regional WHO Office for Europe. Data are collected by computer assisted telephone interviews and web interviews from a representative sample of 1000 adults 18 +years old.

Results: Levels of understanding and easiness of understanding and following recommendations was estimated on the scale from 1 (very difficult)-7 (very easy). Among adults, the understanding of COVID-19 recommendations was stable in all six waves with average rates being higher than 5.5, while there was slight increase in the average grade for following recommendations (4.85 in December 2020 to 5.22 in August 2021). The percentage of adults who were searching for COVID-19-related information very often decreased from 56% of the population doing so in December 2020 to 45% in August 2021. Percentage of population thinking it is highly unlikely to get infected increased from 27% in December 2020 to 47% August 2021, and similarly percentages were found for perceived severity of disease (27% to 34%).

Conclusions: Changes in factors of importance for planning risk communication strategy were observed confirming the need for regular monitoring that allows adaptations and tailoring messages to population needs.

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Vaccination Behavior of Serbian Adults

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Background: The aim of the analysis is to provide understanding of perceptions, motives and barriers for vaccination among Serbian adults.

Methods: We used data obtained through Behavioral insights on COVID-19 survey in Serbia conducted by the Institute of Public Health of Serbia in cooperation with the Ministry of Health of Serbia and support of the World Health Organization. Six waves of repeated cross section surveys using adaptation of WHO study protocol were implemented in the period December 2020 to August 2021. For data collection computer telephone and web assisted interviewing was applied on the sample of 1000 adults 18 or more years old in each survey wave.

Results: Strongly positive vaccination intentions have increased, from 30% adults reporting that they will definitely get vaccinated in December 2020 to 65% in August 2021, while strongly negative vaccination intentions have decreased. Those aged 50 years and more were identified as a group more likely to be vaccinated. Rated on the scale 1 (not at all) to 7 (very much so), the factors that influence decision to get vaccinated rated with highest grade were perceived probability of side effects (5.46 among low intention to vaccinate people and 5.29 with high intentions) and length of period in which vaccine was used (4.55 among low intention to vaccinate people and 4.89 among those with high intentions to vaccinate).

Conclusions: People with low versus high intentions to get vaccinated have different views and worries with regards of COVID-19 vaccination and this should be taken into account when planning communication strategy together with other factors.

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Results of the Applied Strategies for Ensuring a Safe School Environment During the COVID-19 Outbreak

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Background: The COVID-19 pandemic disrupted education systems, inducing changes in Serbian teaching models. The Multisectoral Working Group (MWG) developed a strategy to mitigate the impact of COVID-19 in schools providing the best possible educational process in a safe school environment during the 2021/2022 school year.

Methods: Once a week the MWG analyzed epidemiological indicators and decided on a teaching model (full in-person, reduced in-person and on-line learning) for the following week. Indicators analyzed included: community indicators (14-day notification rate of COVID-19 cases per 100,000 population, percentage of positive tests, change in percentage of new COVID-19 cases in the last 7 days, vaccination coverage) and school-specific indicators (percentage of active COVID-19 cases among students and employees and percentage of classes in the reduced/online teaching model).

Results: From September 1st, 2021 to March 1st, 2022 full in-person learning was applied in 91.9% and 70.7% of primary and secondary schools, respectively. Reduced in-person learning was applied in 7.0% of primary and 25.6% of secondary schools. Whereas, on-line learning was applied in 1.0% and 3.7% of primary and secondary schools, respectively. There were two short school breaks in the periods of highest transmission of COVID-19. The portion of school-age children in the total number of new COVID-19 cases was 6.1%.

Conclusions: Continuous monitoring and in-depth analysis of the epidemiological situation, risks assessment and implementation of prevention and control strategies are preconditions for evidence-based decision making for ensuring quality of education process in a safe school environment during an outbreak.

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Vaccination Along with IPC Measures in Health Facilities Remain Effective in Reducing Severe COVID-19 Cases

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Background: The ongoing COVID-19 pandemic that is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has affected millions of people globally. According to the WHO global surveillance system, 2.5% of reported COVID-19 cases have occurred in health workers.

Methods: WHO has published guidance on National Deployment and Vaccination Plans in which countries are advised to base their decision-making on identification of target populations. Health workers are considered a high priority population (2) with significantly elevated risk of being infected and they are listed among the priority groups for vaccination (3).

Three approved vaccines: BNT-162b2 (BioNTech/Pfizer) mRNA vaccine, the BBIBP Vaccines CorV (Sinopharm), inactivated whole virus vaccine, and the vector vaccines Gam-COVIDVac (Gamaleya Research Institute) have been available to Health workers in Serbia as of early 2021.

Results: Even though vaccines approved through the WHO Emergency Use Listing are highly effective to prevent both symptomatic and asymptomatic infection as well as to reduce severe COVID-19 cases, hospital admission rates and deaths, breakthrough infection cases are possible.

Although the vaccination rate has not been as good as desired, a total of 55 % of Serbian citizens have been vaccinated so far.

Conclusion: Evidence from multiple countries with extensive transmission of variants of concern SARS-CoV-2 has indicated that the implementation of IPC measures along with vaccination in health facilities remain effective in reducing COVID-19 incidence. The rigorous implementation of IPC measures protects health workers from infection and is required to be regularly reviewed and updated.

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Comparison of SARS-CoV-2 Antibody Levels after Vaccine Administration

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Background: Coronavirus disease 2019 (COVID-19) vaccines are indicated for active immunization to prevent COVID-19 disease caused by SARS-CoV-2 virus. In Serbia, there is a possibility of choosing five different vaccines, both according to the mechanism of action and according to the different manufacturers.

After immunization of health workers of UCC Niš, the immune response generated by different types of vaccine was estimated, measuring the antibody titer and assessing the possibility of disease prevention.

Methods: Antibodies to SARS-CoV-2 were determined 4-5 weeks after revaccination of health workers, as follows: 1. group Pfizer-BioNTech mRNA vaccine; group 2. SputnikV (Gam-COVID-Vac, vector vaccine; group 3. Sinopharm COVID-19 vaccine (BBIBP-CorV) inactivated vaccine. All groups were compared with non-vaccinated persons, with and without history of COVID-19.

Immunoglobulins class G were determined as "S" and "N" proteins, by chemiluminescent method on Architect i2000, Abbott instrument.

Results: The highest levels of SARS-CoV-2 IgG S antibodies were recorded after immunization with mRNA vaccine ($x = 5897 \pm 1258$ AU/mL), then vector ($x = 768 \pm 398$ AU/mL) and inactivated vaccine ($x = 659 \pm 388$ AU/mL), while in the group COVID-19 $x = 598 \pm 125$ AU/mL. The highest levels of SARS-CoV-2 IgG N antibodies were observed after the disease and after immunization with the vector vaccine.

Conclusion: Determination of antibodies to SARS-CoV-2 shows different levels of antibodies, mainly depending on the mechanism of action of the vaccine itself. For a complete estimation of disease prevention it is necessary to determine neutralizing antibodies and also estimate cellular immunity.

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Comparative Analysis of Two Different RNA Extraction Methods for SARS-CoV-2 Detection

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Background: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the causative agent of the COVID-19 pandemic. Reverse-transcription real time-PCR (RT-PCR) assay is still the gold standard for the detection of viral genes. However, efficient viral RNA extraction greatly affects RT-PCR testing results.

Methods: This study compared the performance of two different kits for RNA extraction used for SARS-CoV-2 detection. A total of 94 nasopharyngeal samples were randomly selected and RNA was extracted using an automated extraction platform: Sample Release Reagent (Sansure Biotech) and Nucleic Acid Extraction-Purification Kit (Sansure Biotech). RT-PCR was performed using the 2019-nCoV (Sansure Biotech) test.

Results: Among the 94 analyzed samples 8 were positive. N gene was detected in all the positive samples using both extraction methods. ORF1ab gene was detected in 8 out of 8 positive samples using the magnetic beads extraction method and 7 out of 8 positive samples using Sample Release Reagent. RT-PCR results using magnetic beads method, had a decrease in Ct values for the SARS-CoV-2 targets: $\Delta Ct (N) = 4,09$ and $\Delta Ct (ORF1ab) = 7,89$.

Conclusions: Magnetic beads extraction method assures effective removal of enzymatic inhibitors and positively affects the reliability of the results. On the other hand, the lysis buffer provides faster extraction, but the obtained RT-PCR results indicate lower-quality total RNA in the terms of the higher Ct values. However, the advantages of the one-step method are simple operation and significantly shortened detection period for a larger number of samples.

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Significance of Epidemiological Survey in Covid Hospital Batajnica

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Background: Pandemic caused by SARS CoV2 virus has changed the lives of people and their habits and has introduced limitations in everyday life, brought uncertainty and a new dimension of observing reality and care for one's own health and the need to reorganize the healthcare system.

Goals: Showcase how the epidemiological survey is organized in Covid Hospital Batajnica.

Methodology: Expert methodological instruction for prevention and spread control of SARS CoV2 (Institute of public health of Serbia Milan Jovanović-Batut,,; Recommendations of the Center for Disease Control and Prevention (www.cdc.gov/getsmart/healthcare)).

Results: Epidemiological surveillance in Covid Hospital Batajnica includes the surveillance over hospital infection of hospitalized patients. Simultaneously epidemiological surveillance also includes the surveillance and control of spreading COVID 19 infection among those employed in Covid Hospital Batajnica. As the first prevention measure certainly vaccination of the staff against COVID which began on 06.01.2021. with three accessible vaccines. Besides that, the Epidemiology department in Covid Hospital Batajnica had conducted issuing personal protective gear as well as education of the staff on proper and rational usage of protective gear and the way its properly removed and disposed of in order to prevent contamination. Epidemiological surveillance also implies control over adequate and proper handling of infectious waste.

Conclusion: Significance of continuous, everyday and active epidemiological surveillance in Covid Hospital Batajnica has the goal of: multidisciplinary approach to solving the problem of hospital infections, prevention and control the spread of hospital infections, surveillance over the disposal of infectious waste, vaccination of staff against COVID-19.

Keywords: epidemiological surveillance, Covid Hospital, COVID 19

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Prevalence of Individual SARS-CoV2 Variants in Critically Ill Patients in Covid Hospital Batajnica's Intensive Care Unit

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Background: Since the beginning of the pandemic caused by SARS-CoV2 virus multiple variants were detected and their names were given from the letters of Greek alphabet. Since the pandemic began different prevalence of certain variants was confirmed around the world, and in the past few months BA.1 SARS-CoV2 was the dominant one.

Goals: To determine the prevalence of individual SARS-CoV2 variants in Intensive Care Unit (ICU) patients in Covid Hospital Batajnica.

Methods: Samples of oral and nasal swabs for PCR were kept and transported in Sansure Biotech Sample Storage Reagent vials. Sample analysis was conducted in Vatreno Oko laboratory of University Clinical Center of Serbia.

Results: In the studies 48 patients were included from the ICU in Covid Hospital Batajnica from 01.02.2022. to 10.02.2022. Out of the total of 48 patients, 39 of them (81.3%) were registered with the BA.1 SARS-CoV2 variant, BA.2 variant was found in 3 patients (6.3%), variants BA.1 and BA.2 simultaneously were detected in 2 patients (4.2%). Out of all the patients 32 (66.7%) of them were men and 16 (33.3%) were women. Most of the patients were above the age of 60. Out of the total patient number 19 (40%) were unvaccinated. Most common additional diseases were hypertension (66.7%), diabetes (18.8%) and other cardiovascular diseases (14.6%).

Conclusion: From 01 02 to 10 02 2022, most of SARS-CoV2 registered cases was the Omicron variant, most of the patients were men (66.7%), older than 60, unvaccinated and with additional illnesses.

Keywords: Omicron, PCR, ICU

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Clinical Aspects of SARS-CoV-2 Infection in Nephrology

Milan Radović^{1,2}

Background: Severe acute respiratory syndrome Coronavirus type 2 (SARS COV-2) pandemic challenged healthcare systems Worldwide.

Methods: Overview of clinical manifestations and repercussion of Coronavirus disease 19 (COVID) on kidney diseases.

Results: At the pandemic outbreak, COVID mainly manifested as acute kidney injury (AKI). Increasing number of patients' groups with kidney diseases affected differently by COVID was recognized: end stage kidney diseases patients on maintenance hemodialysis (HD), peritoneal dialysis (PD), kidney transplant patients, chronic renal failure (CRF) patients, patients treated by immunosuppressives due to primary glomerular diseases or systemic connective tissue diseases and vasculitides, etc. Prolonged period of AKI recovery required kidney biopsy and provided better insight of lesions: ischemia induced kidney lesions, inflammatory process and lesions of intravascular peritubular capillaries compartment were found. Mortality of AKI patients was high in certain groups of patients (elderly, not vaccinated, comorbidities, intensive care unit). Substantial mortality was observed in HD patients. Modification of immunosuppressive protocols in kidney transplant patients with COVID was needed and intervention with monoclonal antibodies for prevention and treatment of systemic inflammation or antiviral medication treatment. Glomerular filtration rate (GFR) has had an impact on vaccination efficacy and COVID disease outcome in patients with kidney diseases. Post COVID syndrome has been recognized as an upcoming clinical problem that frequently accompanied delayed and incomplete AKI recovery, worsening of CRF and GFR, especially in patients with cardiovascular diseases (hypertension, diabetes, congestive heart failure, etc).

Conclusions: New data about kidney in COVID could improve diagnostic and therapeutic options of kidney diseases.

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Influence of Acute Cardiovascular Events on Fatal Outcome in Patients With COVID-19 Pneumonia

Danijela Lepojevic-Stefanović¹, Nataša Marković-Nikolić¹,
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Abstract: Background and aims: Many patients with Covid-19 pneumonia have had previous cardiovascular disease or have developed acute cardiac or cardiovascular disease during treatment with Covid disease. Understanding the potential link between Covid-19 disease and cardiovascular disease is essential for better and more efficient treatment of these patients. This paper aims to indicate the type and incidence of cardiovascular disease in our patients with COVID-19 pneumonia. The influence of already existing CVD on the occurrence of newly developed cardiac complications and their clinical course was also investigated, as well as the potential connection between newly developed cardiovascular diseases and death in these patients.

Methods: The research plan includes 100 successive patients hospitalized at the Clinic for Internal Medicine of the Clinical Hospital Center Zvezdara, due to moderate or severe Covid-19 pneumonia. The patients included in the study were admitted in the period March 18-April 18, 2021. The research is retrospective-cohort based on the analysis of data from the electronic medical database - Heliant and medical history. All statistical analytical methods were performed in the software package SPSS ver. 21.

Results: The most common cardiovascular risk factor at admission was hypertension, followed by coronary heart disease and diabetes mellitus. The most common acute cardiovascular complications were pulmonary thromboembolism and arrhythmia, while other complications (heart failure, coronary heart disease, pulmonary thromboembolism, conduction disorder, deep vein thrombosis, cerebrovascular stroke) were less common. Diabetes mellitus was singled out as a potential predictor for the development of new heart failure in our patients, because it increases the chance of developing new heart failure 6.76 times. Mortality rate of our patients hospitalized for COVID-19 pneumonia was 12.1%. As possible predictors of a higher

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chance of death for our subjects from the group of electrocardiographic parameters were higher heart rate and the presence of arrhythmia.

The newly emerging cardiovascular event with the greatest effect on the prediction of death was the appearance of a new coronary disease that increases the chance 29 times.

Conclusions: Patients with previous CVD and diabetes during treatment with Covid-19 disease are at higher risk of developing new cardiac complications. New-onset heart failure, new coronary heart disease, new PE and arrhythmia are possible predictors of death of subjects hospitalized for COVID-19 pneumonia.

Keywords: Covid-19; Cardiovascular diseases; Mortality and Coronavirus disease, predictors

Gynecologic Surgery in the Era of COVID-19

Aleksandar Stefanović¹

Background: The pandemic caused by the new coronavirus (SARS-CoV-2) has led to significant changes in the daily work of all segments of the health system. Limited human and institutional resources were followed by selection of patients and changes in existing diagnostic and therapeutic protocols.

Method: Retrospective analysis of effects of the COVID 19 pandemic on the screening and treatment of gynecological malignancies at our institution during 2019 and 2020.

Results: During 2020, compared to 2019, there was a significant decrease in services provided in the field of screening: colposcopy by 54%, cytological (Pap smears) by 47%, gynecological ultrasound examinations by 46 and 47%, as well as a decrease in the number of tumor markers taken by 63%. In contrast to the vaginal and endoscopic approach, the total number of abdominal surgeries in 2020 was comparable to 2019. The number of classic conisations was reduced by 30%, while the number of loop conisations was reduced by 44%. The number of radical hysterectomies was reduced by 30%. The distribution of malignancies by stages did not change in compared periods.

Conclusions: The major changes were noticed in the field of prevention and screening. The number of gynecological malignancies is comparable in observed periods, which may be a consequence of inclusion of certain institutions in the COVID system and thus, referral of oncology patients to tertiary level institutions. The real effects of pandemic on the treatment and prognosis of oncology patients is to be clarified in the future.

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Iatrogenic Air Embolism of the Pulmonary Artery During Contrast Enhanced Pulmonary Angiography - Case Report

Predrag Kovacevic¹

Background: Air embolism of the pulmonary artery during CT pulmonary angiography is an extremely rare complication.

Methods: Case report of a patient with air embolism during CT angiography is presented.

Results: A 32-year-old woman with bilateral COVID pneumonia was admitted. She is on oxygen support at 6 liters/min, maintaining 93% O₂, normotensive and with regular cardiac rate. Drug therapy according to the Protocol is applied. On the fifth day she complains of severe chest tightness, irritation to dry cough, tachycardia up to 120/min and decrease in saturation. Bronchodilator and corticosteroid therapy obtain transient improvement. Later she complains of the same ailments and dry cough. The cardiologist indicated CT angiography of the pulmonary arteries and the radiologist verified the air embolism in the pulmonary stem.

In the intensive care unit a treatment protocol was applied: Trendelenburg position on the left side, bolus 1000 mg methylprednisolone and High flow oxygen therapy, with regular medication according to the Covid protocol. The patient without any clinical symptoms was examined continuously by a cardiologist (ultrasound examinations) until the decision on transport to Belgrade. Treatment continued at the Infectious Diseases Clinic KCS. After 7 days, a controlled CT pulmonary angiography revealed normal finding and she was released for home treatment.

Conclusion: Iatrogenic air embolism of the pulmonary tree is extremely rarely described in the literature. The key to treatment is placement in Trendelenburg on the left side, a corticosteroid bolus and oxygen therapy. An additional risk in this situation is Covid 19 pneumonia and already known thrombotic complications.

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Anesthesiological and Intensive Care Aspects of Obstetric Patients With COVID-19

Tatjana Ilić Mostić^{1,2,3}

Background: The prevailing pandemic of viral pneumonia and multiorgan dysfunction is caused by the newly identified coronavirus 2019 (COVID-19; Coronavirus disease 2019). A serious danger to public health, it is especially deadly in vulnerable groups. Pregnant women and their fetuses represent a high-risk population during the spread of the infection. Physiological and anatomical changes in pregnancy lead to an increased susceptibility to infections in general, and especially when the cardiorespiratory system is overloaded, which accelerates the rapid progression of respiratory failure in pregnant women.

Methods: Infection with a new coronavirus and the disease it causes are not in themselves indications for a cesarean section. If there is respiratory insufficiency, poor general condition and condition of the patient, the pregnancy ends surgically (poor general condition of the pregnant woman affects the status of the fetus). According to the available protocols, it is recommended that the cesarean section be performed under regional anesthesia. Although SARS-CoV-2 is associated with certain neuro tropisms, according to many publications, neuraxial block has not been associated with neurological impairment in mothers with COVID-19, and is equally effective and safe in the highest percentage.

Results: The decision on the application of treatment protocols in pregnant women and mothers with SARS-CoV-2 infection, as well as accommodation in appropriate wards, is made according to the assessment of respiratory status and general condition. Patients who have a very severe clinical picture - progression of hypoxemic respiratory failure, radiographic / MSCT worsening, hemodynamic instability, altered state of consciousness, acute renal failure are treated in Intensive Care Units.

Conclusions: Anesthetic treatment and working in Intensive Care Units requires well-trained staff and teams of obstetric anesthesiologists, as well as a multidisciplinary approach and adequate application of all treatment protocols.

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Diagnostic Value of Cardiac Magnetic Resonance Imaging In Covid-19

Ružica Maksimović^{1,2}, Gordana Krljanac^{2,3}, Olga Nedeljković¹,
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Background: COVID-19 is causing considerable morbidity and mortality along with myocardial injury that can be evaluated using cardiac magnetic resonance imaging (CMR). Myocardial injury has been associated with a worse prognosis. Therefore, the aim of the study is to identify myocardial injury in patients after COVID infection for further clinical evaluation and therapy.

Methods: The study was conducted in the Clinical Center of Serbia and included 126 patients, 61 (48%) male, mean age 45±15 years. All patients underwent clinical workup, lab analysis, ultrasound, and CMR. CMR was done using standard protocol for morphological and functional assessment, late gadolinium enhancement (LGE), as well as T1 mapping using MOLLI sequence, before and after contrast media application.

Results: Meantime to CMR after the onset of infection was 107 days. The major findings include: LGE was seen in 61/126 (48%) pts, distribution was predominantly transmural pts 41/61 (67%), in more than three segments were identified in 37/61 pts (61%), myocardial edema was seen in 50/126 pts (40%). None of the clinical symptoms was associated with LGE, LGE distribution, or the number of affected segments. LVEF was significantly lower in patients with more than 3 affected segments in comparison to those with less than 3 segments, 58±12% vs 62±3%, other parameters were LVEDV (144±47 vs 135±38 ml, respectively) and LVESV (63±37 vs 51±14 ml, respectively).

Conclusions: COVID 19 is causing myocardial injury in a significant number of patients. CMR is a valuable tool in the evaluation of these patients and risk identification. Early detection of acute or chronic sequelae of infection is of the utmost importance for an optimal therapeutic approach in these patients.

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Inappropriate Use of Ivermectin During the COVID-19 Pandemic: *Primum Non Nocere!*

Aleksandra Barac¹, Ivana Milosevic¹, Ankica Vujovic¹, Goran Stevanovic¹

Background: There is an ongoing debate worldwide about the possible benefits of ivermectin for the treatment and prevention of COVID-19. Some advocacy groups concluded, based on limited, early trials, that ivermectin might be beneficial. They continuously lobby for the widespread use of ivermectin for the treatment and prevention of COVID-19, especially through social media. Based on their advice, some medical doctors of different specialties in many countries have recommended the use of ivermectin for COVID-19 treatment and prevention.

Methods: We provided an opinion on this problematic issue, as the inappropriate use of ivermectin is causing serious health damage in some European countries.

Results: We assessed the overall certainty of evidence for the use of ivermectin in the treatment and prevention of COVID-19 as low or very low after considering all of these factors. The conclusion is a strong recommendation against any use of ivermectin to treat COVID-19 patients.

Conclusions: Even in a pandemic crisis, however, it is unethical and immoral to advocate for the broad use of a medication that has not been proven effective in clinical trials. The results from the available well-designed clinical studies so far do not support the commonly promoted benefits of ivermectin. The risk of injury by ivermectin is not balanced by any benefits of this drug in the treatment and prevention of COVID-19. Ivermectin has been shown to have negative side effects when used to prevent or treat COVID-19. As a result, Ivermectin should not be used to treat COVID-19.

Keywords: Ivermectin, COVID-19, treatment, ESCMID guidelines, clinical trial

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Presentation of European Society of Clinical Microbiology and Infectious Diseases (ESCMID) COVID-19 Treatment Guidelines and Comparison with Serbian National Guidelines for COVID-19

Aleksandra Barac¹, Ivana Milosevic¹, Ankica Vujovic¹, Goran Stevanovic¹

Background: The ongoing pandemic generated a historical effort involving many researchers worldwide and prompted an unprecedented number of clinical trials. Heterogeneity of national recommendations and lack of appropriate evidence led to contradictory attitudes in the treatment of COVID-19 worldwide, which did more harm than good.

Methods: An ESCMID COVID-19 guidelines task force was established by the ESCMID Executive Committee. A long list of clinical questions using the PICO (population, intervention, comparison, outcome) format was developed at the beginning of the process. For each PICO, two-panel members performed a literature search with a third panelist involved in case of inconsistent results. Voting was based on the GRADE approach. WHO severity criteria for COVID-19 were used. Data from the European Center for Disease Prevention and Control (ECDC) was used to define risk factors and groups for severe COVID-19.

Results: A synthesis of the available evidence and recommendations is provided for each of the 15 PICOs, which cover the use of hydroxychloroquine, bamlanivimab (+/-etesevimab), casirivimab, ivermectin, azithromycin and empirical antibiotics, colchicine, corticosteroids, convalescent plasma, favipiravir, remdesivir, tocilizumab and interferon β -1a, as well as the utility of antifungal prophylaxis and enoxaparin. In general, we recommended against the use of hydroxychloroquine, ivermectin, azithromycin, colchicine and interferon β -1a. Conditional recommendations were given for the use of monoclonal antibodies in high-risk outpatients with mild-moderate COVID-19, and remdesivir. There was insufficient evidence to make a recommen-

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dation for use of favipiravir and antifungal prophylaxis, and it was recommended that antibiotics should not be routinely prescribed in patients with COVID-19 unless bacterial coinfection or secondary infection is suspected or confirmed. Tocilizumab and corticosteroids were recommended for treatment of severe COVID-19 but not in outpatients with non-severe COVID-19. Compared to Serbian National Guidelines for COVID-19, there are no significant differences in recommendations, only the slight recommendation for use of favipiravir which was routinely prescribed to outpatients, before molnupiravir was available.

Conclusions: The aim of the present guidelines is to provide evidence-based recommendations for the management of adults with coronavirus disease 2019 (COVID-19). More specifically, the goal is to aid clinicians in managing patients with COVID-19 at various levels of severity including outpatients, hospitalized patients, and those admitted to the intensive care unit.

Keywords: COVID-19; Disease progression; Guidelines; Mortality; Treatment.

Pneumonia in Medical Professionals During COVID-19 Outbreak in Cardiovascular Hospital

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Milovan Bojic^{1,2}, Goran Loncar^{1,2}

Background: The pandemic of coronavirus associated disease (COVID-19) placed the health care workers at high risk. We investigated clinical and treatment characteristics of infected medical professionals in a cardiovascular hospital.

Methods: The study was retrospective, conducted in a tertiary cardiovascular hospital and included employees with confirmed coronavirus infection. They filled in a questionnaire about health status, symptoms, admission to hospital and treatment. The vaccination status against tuberculosis, hepatitis B and seasonal influenza was assessed. Pneumonia was defined as CT finding of ground glass opacifications (GGO) with consolidations typical for COVID-19.

Results: The study included 107 confirmed cases of COVID - 19 out of 726 employees (15%). Most of the infected were from the cardiac surgery department (74/107, 69%). Substantial number of employees did not have any symptoms [31 (28.9%)] and 38 patients (35.5%) were admitted to hospital. The average length of stay was 8.1±5.6 days. Seventy-five of 107 (70.1%) received seasonal influenza vaccine. Pneumonia with CT features of GGO and consolidation occurred in 25/107 (23.4%) patients of which 14/107 (13.1%) had bilateral involvement. In multivariate logistic regression analysis including recognized characteristics associated with worse outcomes in COVID-19 (obesity, diabetes mellitus, coronary artery disease, cerebrovascular disease, current smoking, heart failure, influenza immunisation), only influenza immunisation remained an independent predictor of occurrence of bilateral pneumonia (OR 0.207; 95%CI[0.050 – 0.847]; p=0.029).

Conclusions: The association of influenza immunisation and less aggressive form of pneumonia might provide a finding that supports the institution of preventive measures that can be beneficial in reduction of global coronavirus burden.

Keywords: coronavirus, pneumonia, influenza, immunisation

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Vascular Complications of COVID-19. Single COVID Center Experience

Marko Ajduk¹, Tomislav Šalamon²

Background: Vascular complications are among hallmarks of COVID-19 disease. The SARS-CoV-2 virus induces damage to endothelial cells through sequence of events which leads to thrombosis. Arteries and veins are affected by this events. Arterial thrombosis usually occurs in small vessels but thrombus formation can be found in any artery including aorta. Bilateral distribution occurs frequently. Venous thrombosis is frequently seen in severely ill patients, often subclinical. Spontaneous hematomas occurring in COVID-19 patients may require surgical intervention.

Methods: During the pandemic period 2000-2001 University Hospital Dubrava (UHD) was the regional COVID center. Vascular surgery service was limited to treating patients with vascular complications of COVID and COVID patients with emergent and urgent vascular pathology such are symptomatic carotid artery stenosis, chronic critical limb ischaemia and large, symptomatic or ruptured aneurysms. By the end of May 2021, 5537 COVID patients were admitted to UHD.

Results: Forty eight patients were operated for arterial thrombosis, mean age was 71 years. Bilateral arterial thrombosis and re-thrombosis occurred in 12.5 % and 19% of patients, respectively. Overall mortality of patients with COVID and arterial thrombosis was 48% (100% in patients needing mechanical ventilation, 18% in patients without need for oxygen supplementation and 55% in patients with rethrombosis). Almost 30% of patients had ultrasound verified deep venous thrombosis. Eight patients had spontaneous hematomas requiring surgical intervention, mostly due to development of compartment syndrome.

Conclusions: Vascular complications of COVID-19 are more often in more seriously ill patients and in these patients they are a marker of worse prognosis. Optimal anti-coagulation therapy should be balanced against its complications.

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Life of a Gastroenterology and Hepatology Clinic in the Era of COVID-19- Single Centre Experience

Petar Svorcan^{1,2}, Dušica Vrinić-Kalem¹, Srđan Marković^{1,2}, Miloš Mitrović¹

Background: Coronavirus disease 19 rapidly reached pandemic proportions. The aim of this retrospective study is to show the experience of our center during the pandemic period from a gastroenterologist standpoint, and to address questions concerning the effects of COVID-19 on inflammatory bowel disease (IBD) and chronic liver disease patients.

Methods: We retrospectively analyzed the medical records of 8569 patients admitted to the University Medical Center Zvezdara from April 3, 2019, to November 24, 2021.

Results: A total of 3247 patients (37.9%) complained of at least one gastrointestinal symptom in the course of the disease, with diarrhea being the most common one, present in 1319 patients (15.3%). Elevated aminotransferases were common in hospitalized patients, observed in 2939 (34.4%). The Aspartat aminotransferase 5-times above the upper normal limit correlated with more severe disease (HR 1.81, 95%CI 1.1-2.3). The prognosis of COVID 19 patients with fatty-liver disease and diabetes mellitus was unfavorable (HR 2.34, 95%CI 1.77-3.12). The survival and morbidity of IBD and other chronic liver disease patients hospitalized with the COVID-19 did not differ significantly from the general population. Increased use of telemedicine resulted in greater adherence of IBD patients to their therapy. It is estimated that our gastrointestinal endoscopy unit canceled approximately 40% of its elective procedures. Multiple precaution measures led to no endoscopy-related COVID-19 transmissions reported to-date.

Conclusion: COVID-19 pandemic had a profound effect on the every-day work of our unit, but with many lessons learned, could lead to even better patient care in the post-pandemic period.

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Use of Antibiotics in COVID-19 Patients

Rusmir Baljić¹

Background: COVID-19 is a disease caused by the SARS-CoV2 virus. The first cases of the disease were discovered in China, and the disease spread very quickly around the world. The aim of this paper is to present the current knowledge and experience in the use of antibiotics in the treatment of COVID-19, with an attempt to influence doctors to approach this problem rationally.

Methods: Overview of medical practice related to use of antibiotics in COVID-19 patients.

Results: Faced with an unknown, the health system tried to find a solution in the therapeutic approach to this disease as soon as possible. In the very beginning, various already available drugs were used, which were primarily registered for use in other diseases. These were antivirals, and the effects were different. However, immediately from the first days of the fight against COVID-19, non-selective use of antibiotics began. In the first place, the use of chloroquine and hydroxychloroquine was started. It was abandoned very quickly, because the relevant studies did not prove any special benefit from the use of these drugs. After that, azithromycin came into use, which is still used with greater or lesser intensity in the treatment of COVID-19. The basis for its use was not antibacterial, but anti-inflammatory, and even mild antiviral action of this drug. In everyday practice, we still encounter a non-selective and irrational approach in the therapy of COVID-19, which primarily implies the use of antibiotics, and in those situations when there is no suspicion of the development of secondary bacterial infections. The number of antibiotics administered reaches up to five different ones for the same patient, most of which are given at the same time.

Conclusion: The consequences of such use of antibiotics will certainly be long-term and will be reflected in widespread resistance.

Key words: COVID-19, antibiotics, resistance

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Possibilities and Importance of Physical Medicine and Rehabilitation in the Acute and Subacute Phase in Patients with COVID-19

Sanja Tomanović Vujadinović¹

Background: The COVID-19 pandemic has dramatically affected the world humans, health and economic resources. New knowledge in the treatment of these patients have engaged almost all health sectors. The disease is characterized by a large number of critically ill patients and thus prolonged bed rest, which leads to muscle atrophy and patients' deconditioning. In order to prevent complications, rehabilitation was introduced in the Covid-19 treatment protocols.

Methods: We researched the guidelines and consensus approach of a group of international experts in cardiorespiratory physiotherapy which has prepared clinical practice guidelines for the physiotherapy management of Covid-19, originally convened on March, 2020. We have also used our own experience gained in Covid Hospital Batajnica, in Belgrade, Serbia from December 2020 to March 2022.

Results: The study highlighted two main characteristics of rehabilitation activities in the care of patients with Covid-19. One refers to the organization of physical therapy as soon as possible in Intensive Care Units and the second issue is to consider the organization of rehabilitation of large numbers of patients discharged to hospital wards, where the implementation of rehabilitation is a key factor in recovery. Entry criteria for starting rehabilitation have been defined.

Conclusion: With increased understanding of COVID-19 and the accumulation of our clinical experience, physical medicine and rehabilitation has taken a major role in preventing disability of Covid-19 patients focusing on the three main areas: positioning, early mobilization and respiratory rehabilitation.

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Features of Care For Patients with Vascular Diseases in the Era of COVID-19

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Temirlan Gamzatov¹, Evgeniya Vasyukova¹, Alexey Kebriakov¹

Background: As a result of the COVID-19 pandemic, Russia experienced an 18% increase in mortality in 2020. At the same time, a significant part of the deaths was caused by other diseases not associated with COVID-19. The experience of hospitals and the organization of medical care for patients in Russia and St. Petersburg during the COVID-19 pandemic is presented. Clinical cases of hemorrhagic and thrombotic complications of COVID-19 are demonstrated, methods of their treatment are highlighted, including the use of modern methods of vascular surgery.

Methods: Overview of care for patients with vascular diseases in the era of COVID-19

Results: In St. Petersburg, about 50% of deaths in 2020 were due to cardiovascular diseases. This trend is observed, among other things, due to the fact that many patients could not receive specialized care in time. The overcrowding of repurposed hospitals, the decline in physical activity among the population, and the low frequency of vaccination have led to organizational health problems that need to be addressed. An increase in cardiovascular events is also directly related to the pathogenesis of COVID-19. Violation of the mechanisms of the hemostasis system leads to both hemorrhagic and thrombotic complications against the background of COVID-19, which often have an atypical course.

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Arterial Thrombotic Events During the COVID-19 Pandemic and the Impact of the Delta Variant

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Epaminondas Zakynthinos², Athanasios Giannoukas¹, Miltos Matsagkas¹

Background: The pathophysiology of COVID-19 associated arterial thrombosis is multifactorial. The purpose of this study is to report the experience of a tertiary center in Greece regarding hospitalized, COVID positive patients suffering an arterial thrombosis.

Methods: All hospitalized patients due to COVID-19 in a single tertiary center presenting arterial thrombosis from March 2020 to February 2022 were retrospectively recorded. Patients' age, medical history, antithrombotic treatment, clinical and imaging findings were analyzed. Outcomes included revascularization, amputation and mortality during the available follow-up.

Results: Twenty patients were included; 50% were hospitalized to the ICU. The mean age was 65 years (16-82 years) and 90% were males. Eighteen cases were positive for the Delta variant (May-December 2021). All patients reported symptoms related to lower extremity ischemia; 20% referred symptoms from bilateral limbs. All patients underwent computed tomography angiography. The popliteal and tibial arteries were involved in 70% of them. Before diagnosis, all patients were under thromboprophylaxis. After diagnosis, the treatment was converted to therapeutic dose. Ten patients were managed conservatively, six underwent revascularization and four were amputated. Nine patients died during hospitalization. The mean follow-up was 18 months. In 6 out of the 10 cases managed conservatively, a thrombus resolution was recorded. No death was reported after discharge.

Conclusions: Covid-19 arterial thrombosis may affect young patients and is associated with 50% mortality during hospitalization. Delta variant was related to arterial thrombotic events in 90% of cases in this analysis. Conservative treatment may be chosen in these high-risk patients with acceptable thrombus resolution rate.

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COVID-19 and Thrombosis of Lower Limb Arteries

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Purpose: Improve the treatment results of COVID-19 patients with thrombosis of lower limb arteries (LLA).

Methods: We analyzed 72 patients with LLA thromboses from September 2020 until January 2022, which were divided into 2 groups. Main group included 38 patients, who had COVID-19 before the admission, whereas the control group included 34 covid-free patient. All patients underwent catheter thrombolysis and thromboaspiration with urokinase.

Results: Laboratory investigation detected an increase of D-dimer— 3.2 ± 0.8 and 2.1 ± 0.5 $\mu\text{g/mL}$ and fibrinogen— 685 ± 23 and 541 ± 16 mg\% at patients of the main and control group respectively. According to initial hypercoagulation, Rivaroxaban 30 mg qDay and 15 mg qDay were prescribed to patients from main and control group respectively. Average dynamic changes of these parameters: D-dimer— $2.8-2.1-1.9-1.0 \pm 0.6$ and $1.9-1.3-1.0-0.6 \pm 0.3$ $\mu\text{g/mL}$ and fibrinogen— $562-422-368-325 \pm 12$ and $466-388-322-275 \pm 10$ mg\% in main and control group respectively. Bed-day length in main group was 12 ± 2 days, in control 9 ± 2 days. Despite the performed thrombolysis and thromboaspiration in 2 cases of the main group, there were established rethrombosis, whereas in the control group—1. Mortality was 1 in main group and 0 in control group.

Conclusion: COVID-19 in anamnesis influences on hemostasis by tipping a balance to hypercoagulation, which has malignant tendency and unfavorable consequences are high accordingly. The absence of unified anticoagulant therapy, coagulation balance disturbance in patients who had coronavirus infection and poorly studied long-term treatment results reveal the necessity of further studies.

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Challenges in Management of Chronic Pain Patients During COVID-19 Pandemic – Lessons Learned

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Iulia Pirvulescu¹

Background: The COVID-19 pandemic has created unprecedented challenges in pain management, creating unnecessary suffering for chronic pain patients. Interventional pain management (IPM) was initially classified as "elective," so numerous pain practices across the US were forced to close during the pandemic, leaving chronic pain patients untreated for indefinite periods.

Methods: The goal of this presentation is to review and explain all challenges that we had during the COVID-19 pandemic and lessons learned from this situation.

Results: Due to the ability to minimize person-to-person contact, telehealth and pharmacotherapy played a more significant role in IPM during the pandemic, but their increased utilization has also led to the exacerbation of substance abuse and the opioid epidemic. We had to use different re-opening tools and techniques to enable a vigilant resumption of in-person interventional pain practice. The possible interaction between steroid use and its immunosuppressive effects between the COVID-19 and the COVID-19 vaccine was another challenge. Due to the extensive use of steroids for multiple illnesses, with their side effects, steroid distancing or banning of steroids in various injections, including those of epidurals and intraarticular injections has been proposed. With the COVID-19 pandemic, multiple side effects of steroids have been recognized which led to either a decrease in steroid doses or using local anesthetic alone.

Conclusions: In conclusion, many IPM procedures cannot be indefinitely postponed without adverse consequences. Furthermore, extensive evidence shows that there is no significant difference with injections of local anesthetic alone or in combination with steroids.

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Challenges in the Diagnosis of SARS-CoV-2 in the University Clinical Centre of Serbia – Our Way from the Unknown to the Top Routine

Snežana Jovanović¹

Background: On December 31, 2019, the World Health Organisation (WHO) warned of pneumonia of unknown aetiology in Wuhan, China. Rapid and accurate diagnosis of COVID-19 is crucial for the control of epidemic.

Methods: In order to introduce a diagnosis and increase COVID-19 testing capacity, on March 27, 2020, Department of Medical Microbiology, University Clinical Centre of Serbia was reorganised in staff and equipment. We started with molecular and serological diagnostics, and months later with tests for detection of SARS-CoV-2 antigen (Ag-RDT). On May 27, 2020, mass molecular testing at the National Laboratory for molecular diagnostics "Fire Eye" was started. Several real-time PCR (RT-PCR) protocols were applied. BGI RT-PCR (BGI Group, Shenzhen, China) was used for mass testing. The External Quality Control (EQC) was conducted in July 2020 and September 2021 (ECDC), and in December 2020 (WHO).

Results: Over the past two years, in Section of Virology we performed: 5.921 RT-PCRs, 75.807 Ag-RDT for detection of viral antigens, 37.373 rapid tests for detection of IgM and IgG antibodies and 491.995 RT-PCR tests in "Fire Eye" Laboratory. The EQC results confirmed the top quality of our work. For determining Omicron sub variants BA.1 and BA.2, in February 2022 we introduced Vir SNIP SARS-CoV-2 Spike S371L S373P Kit (TIB Molbiol, Berlin, Germany).

Conclusions: In response to the challenges of the COVID-19 pandemic from a Department that processed up to 1.400 RT-PCR analyses per year, we became a Department that issued up to 3.400 samples per day with EQC-certified quality and reliability.

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Vascular Surgery COVID-19 Collaborative (VASCC)

Zoran Rancic¹

Objective: During the COVID-19 pandemic, central venous access line teams were implemented at many hospitals throughout the world to provide access for critically ill patients. The objective of this study was to describe the structure, practice patterns, and outcomes of these vascular access teams during the COVID-19 pandemic.

Methods: We conducted a cross-sectional, self-reported study of central venous access line teams in hospitals afflicted with the COVID-19 pandemic. To participate in the study, hospitals were required to meet one of the following criteria: development of a formal plan for a central venous access line team during the pandemic; implementation of a central venous access line team during the pandemic; placement of central venous access by a designated practice group during the pandemic as part of routine clinical practice; or management of an iatrogenic complication related to central venous access in a patient with COVID-19.

Results: Participants from 60 hospitals in 13 countries contributed data to the study. Central venous line teams were most commonly composed of vascular surgery and general surgery attending physicians and trainees. Twenty sites had 2657 lines placed by their central venous access line team or designated practice group. During that time, there were 11 (0.4%) iatrogenic complications associated with central venous access procedures performed by the line team or group at those 20 sites. Triple lumen catheters, Cordis (Santa Clara, Calif) catheters, and non tunneled hemodialysis catheters were the most common types of central venous lines placed by the teams. Eight (14%) sites reported experience in placing central venous lines in prone, ventilated patients with COVID-19. A dedicated line cart was used by 35 (59%) of the hospitals. Less than 50% (24 [41%]) of the participating sites reported managing thrombosed central lines in COVID-19 patients. Twentythree of the sites managed 48 iatrogenic complications in patients with COVID-19 (including complications caused by providers outside of the line team or designated practice group).

Conclusions: Implementation of a dedicated central venous access line team during a pandemic or other health care crisis is a way by which physicians trained in central venous access can contribute their expertise to a stressed health care system. A line team composed of physicians with vascular skill sets provides relief to resource-constrained intensive care unit, ward, and emergency medicine teams with a low rate of iatrogenic complications relative to historical reports. We recommend that a plan for central venous access line team implementation be in place for future health care crises.

Keywords: Central venous access; Central line teams; Iatrogenic injuries

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COVID-19 in patients with primary immunodeficiency - Single Centre Experience

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Background: Patients with primary immunodeficiency (PID) have been considered particularly vulnerable to SARS-CoV-2 infection.

Methods: Clinical and laboratory data from the medical records of 57 patients with different types of PID, between March 2020 and February 2022, have been retrospectively analysed (median follow up 10, IQR 3.5-12.5 months).

Results: Among our PID patients, 22/57 (38.6%) had COVID-19 (PID/COVID), so the cohort of PID/COVID encompassed 15/22 (68.1%) patients with Common Variable Immunodeficiency (CVID), 4/22 (18.1%) with Agammaglobulinemia (AGA), 1/22 (4.6%) with Chronic granulomatous disease (CGD), 1/22 (4.6%) with CTLA-4 deficiency syndrome (CTLA-4DS), and 1/22 (4.6%) with 21q deletion syndrome (21qDS). Mild/moderate form of COVID-19 had 68.1%, severe 27.3%, and critical 4.6% patients; 41.5% required hospitalization and 4.6% had the lethal outcome. Patients from different PID categories (AGA, CVID, CGD, and CTLA-4DS) suffered from severe, while patient with combined immunodeficiency (21qDS) developed critical illness. In comparison, healthy people usually present with mild/moderate in 80%, severe disease in 15%, while 5% progress to critical illness. Prolonged SARS-CoV-2 positivity and inflammatory relapses had 3/22 (13.6%), two patients with AGA and the patient with CGD. Most of our PID/COVID patients were treated with antibiotics (77.3%), while 63.6% received antivirals (favipiravir, remdesivir, molnupiravir), 36.4% corticosteroids, 13.5% convalescent plasma, 9.1% tocilizumab, and 9.1% monoclonal antibodies (casirivimab/imdevimab).

Conclusions: Bronchiectasis, malignancies, enteropathy, IgG concentrations below normal values, and combined immunodeficiency have been associated with severe/critical illness. Prolonged positivity and post COVID-19 inflammatory relapses were associated with agammaglobulinemia, bronchiectasis and regular antibiotic prophylaxis due to presence of severe chronic lung disease.

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The Effect of the COVID-19 Pandemic in Cardiovascular Practice in Greece

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Background: The Covid-19 pandemic has affected human behavior and burdened health systems and has thus had an impact on other health outcomes. This paper studies whether there was a decrease in cardiac surgery operations in Greece during the first wave of the Covid-19 pandemic.

Methods: We used data from 7 major hospitals that geographically cover about half the country and more than half the population, including a mix of public, private, military and children's hospitals. We used a difference-in-differences econometric approach to compare trends in cardiac surgery before and after the pandemic in 2020, to the same months in 2019, controlling for seasonality and unemployment, and using hospital fixed effects. Additionally, all the cases of mechanical complications (including ventricular septal rupture, free wall rupture and ischemic mitral regurgitation) of myocardial infarction during this period were compared with such cases of the same months of 2019.

Results: We found that during the first wave of the pandemic and the associated lockdown, there were 35-56% fewer cardiac surgery operations compared to what we would have expected in the absence of the pandemic. As regards the mechanical complications of myocardial infarction the incidence during the lockdown was approximately 3-fold higher (20 cases) compared to the same months of 2019 (7 cases).

Conclusions: There was a steep decline in Cardiac surgery operations in Greece during the first wave of the Covid-19 pandemic. Possible reasons may include people not seeking medical attention to avoid the risk of catching Covid-19; fewer referrals; and working from home, thus not being exposed to a stressful work environment or commute. On the other hand, the cases of mechanical complications were tripled during the lockdown, a finding which is indicative that the neglected cases were increased significantly. Therefore, it can be speculated that a lot of patients avoid visiting hospitals or postpone examinations due to fear of Covid-19 pandemic.

Keywords: Covid-19; cardiac surgery; hospitalisations; lockdown

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Pregnancy Loss and COVID-19

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Backgrounds: Pregnant women are more vulnerable to viral infection and viral infections can be harmful to embryos and fetuses. Despite this known association, and the fact that the action of the maternal immunological response to virus can cause trophoblasts and placental damage, more studies have been aimed at birth outcomes in women with COVID-19, than at impact on the pregnancy loss. Majority of authors suggests that frequency of miscarriage is not increased above baseline, while others report higher risk.

Methods: In the Clinic for Gynecology and Obstetrics (University Clinical Center of Serbia) we investigated the SARS-CoV-2 as a risk factor for the early pregnancy loss (up to 12+6/7 gestational weeks) and for any pregnancy demise up to 22nd week of pregnancy.

Results: From June 2020 to December 2021 there were 902 cases of early and late abortions (defined as the sum of 1st trimester abortion; missed abortion; blighted ova and intrauterine deaths of fetus) in the population of non-infected pregnant women, patients following COVID-19, and in patients with current infection (32 cases treated in hospital's isolation department).

Conclusions: Comparing the miscarriage rate from that period with miscarriage rate in matching period of 2018 and 2019, we found no significant difference in the total number of pregnancy loss. Also, in histopathological samples no evidence of virus direct effect was found. Having in mind study limits and the importance of identification of the reasons behind the pregnancy loss in COVID-19 patients, these results require further (population-based) investigation.

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Deep Vein Thrombosis in Hospitalized Patients with COVID-19

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Background: The coronavirus disease of 2019 (COVID-19) due to SARS-CoV-2 infection has been found to cause an increased risk of venous thromboembolism. The aim of this study is to describe our experience in the treatment of deep vein thrombosis (DVT) during the lockdown and the prevalence of DVT in noncritically ill patients with COVID-19 pneumonia.

Methods: We describe the management of cases of suspected deep vein thrombosis in our center, as well as the different strategies during the diagnostic-therapeutic algorithm.

In our center was performed a prospective cohort study of 67 patients who had been admitted because of COVID-19 pneumonia during April 2020. The deep veins were examined using compression duplex ultrasonography with the transducer on B-mode.

All the patients were assessed clinically by a vascular surgeon, and the Wells score was calculated. The patients were separated into two groups for statistical analysis: those receiving low-molecular-weight heparin (LMWH) prophylaxis and those receiving intermediate or complete anticoagulation treatment.

Results: All 57 patients had undergone compression duplex ultrasonography. Of these 57 patients, 6 were diagnosed with DVT, for an in-hospital rate of DVT in patients with COVID-19 pneumonia of 10.5%. All the patients who had presented with DVT had been receiving LMWH prophylaxis. The patients receiving prophylactic anticoagulation treatment had a greater risk of DVT (16.21%; 95% confidence interval, 0.04-0.28; P 0.056) compared with those receiving intermediate or complete anticoagulation treatment.

Conclusions: Non Critically ill, hospitalized patients with COVID-19 pneumonia have a high risk of DVT despite receipt of correct, standard thromboprophylaxis.

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Diabetes during COVID-19: Therapeutic Implications

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Background: The first epidemiological studies in China after the onset of COVID-19 pandemic, already have focused on diabetes. Thus, it has been shown that the mortality of COVID-19 was 50% higher in patients than in those without diabetes. Later, it has been demonstrated that COVID-19 can facilitate the onset of diabetes de novo.

Methods: Literature review of COVID-19 and diabetes therapeutic implications

Results: Having in mind that the pathophysiology of type 2 diabetes (T2D) per se have involves the low-grade intensity inflammation and the increases in inflammatory mediators, including IL6, the similar processes develop within COVID19, The overlap results in the faster development of the cytokine storm and the severe clinical course of the infection. Those findings have resulted in the early need, in the year 2000, of defining the first recommendations for the treatment of diabetes during COVID-19. Those recommendations postulated the importance of the strict metabolic control, with relevant strict target values for glycemia and HbA1c.

Conclusions: When therapeutic agents are concerned, it has been recommended that, in the case of the optimal control, the antihyperglycemic treatment should remain unchanged, before the infection or in the settings of outpatient treatment of COVID-19. However, when the patient is hospitalized, the switch to insulin treatment is recommended, as the therapy of choice, especially in severe clinical courses, when the treatment is combined with continuous glucose monitoring and the follow-up of other relevant markers. Recent studies have implied that the combination of insulin with other injectable antihyperglycemic agents might improve the efficacy of the therapy, which remains to be confirmed.

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Guillain Barre Syndrome after COVID-19

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Background: Guillain Barre syndrome (GBS) is a postinfective inflammatory disease, characterized by rapidly progressive symmetric and typically ascendent weakness of the limb. This is a disease of the peripheral nervous system with reduced or absent deep tendon reflexes and present with paresthesia and sensory symptoms on upper and lower extremities. Like the other viruses, Covid 19 may induce post-infective GBS. We analyzed post Covid GBS characteristics vs age and gender matched non Covid GBS control groups.

Methods: We compared demography, comorbidities, GBS disability scale and admission on discharge, clinical pictures, autonomic dysfunction, mechanical ventilation, complication, electrophysiological changes, length of stay and outcome between two groups.

Results: Post Covid GBS patients (N=17, 10 male, mean age 55.2 ± 14.8) in compared with non Covid GBS (N=26, male 17, mean age 56.5 ± 15.7) have had much more sensitive disturbances at admission (100% vs 69%, $p < 0.014$) and higher level of cerebrospinal proteins (1.07 (IQR 0.83-3.32) vs. 0.64 (IQR 0.46-1.19), $p < 0.035$). There was no statistical significance in the other variables.

Conclusion: Patients with post COVID GBS have had more sensitive disturbances at the outset of disease and greater protein concentration in cerebrospinal fluid.

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The Effect of the COVID-19 Pandemic on the Major Lower Limb Amputation Rate in the Department of Vascular Surgery of the University Medical Center Maribor

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Background: During COVID-19 pandemics, the accessibility of the health care system was diminished, and delays in timely care of foot complications in patients with peripheral arterial obliterative disease ensued. Epidemiologic data suggested an increase in major lower limb amputation rates in the northeastern part of Slovenia (31 per 100.000 in the pre-pandemic period – the year 2019 as opposed to 37 per 100.000 in the pandemic years – 2020 and 2021). The gross preliminary analysis suggested a similar increase in the major tertiary vascular surgery department. The retrospective observational study was devised to test the assumption of increased major lower limb amputation rates at the department.

Methods: Included were all admitted patients in the pandemic time period (12.3.2020 – 31.12.2020) and the equivalent pre-pandemic time period (12.3.2018 – 31.12.2019) to manage the possible effect of seasonal variation in amputation rates. Excluded were patients treated for varicose veins without ulcer, carotid disease, and construction of dialysis access in both cohorts (pre-pandemic and pandemic). The exclusion was necessary to mitigate the effect of high volume procedures in pre-pandemic time that have a low risk for amputation and were significantly reduced or completely stopped during the pandemic time. To calculate the relative amputation rate, we used all patients with an amputation above ankle as the numerator and the total number of included patients as the denominator in both time periods. A chi-square test of homogeneity was conducted between pre-pandemic and pandemic time period for major lower limb amputation. The odds ratio was also calculated.

Results: The relative major lower limb amputation rate in the pandemic time period was 7751 per 100.000 censored admissions (censored per exclusion criteria) as opposed to 6909 per 100.000 censored admissions in the equivalent pre-pandemic time

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period. A chi-square test of homogeneity was conducted between pre-pandemic and pandemic time period for major lower limb amputation. There was a non - statistically significant difference in proportions of major lower limb amputations, Chi-Square(df=1) = 1.077, p = 0,299. The odds ratio (OR) for major amputation in pre-covid versus covid period is 1,141 (95% CI, 0,889 to 1,465).

Conclusion: Preliminary data suggested a statistically significant difference in major lower limb amputation rates in both pandemic and pre-pandemic time periods. However, in the pre-covid time period, the low risk for amputation patients was more frequent. By introducing the exclusion criteria for those patients the difference in amputation rate did not reach statistical significance. Although accessibility of the health care system at the primary level was majorly diminished in the pandemic era, and the number of operative procedures was significantly reduced there is no difference in major lower limb amputation rate. The data might suggest an over-treatment of several vascular pathologies.

COVID-19 Pandemic Outbreak in Lombardy, Italy: How SARS-CoV-2 Changed Vascular Surgery

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Background: From the dramatic initial outbreak of COVID-19 pandemic in Italy (February 2020), several strategies have been taken to remodel the hospitalization system in order to allocate appropriate resources to treat COVID-19 patients and to identify “Hub/Spoke” hospitals for highly specialized medical activities. Identified “Hub” hospitals were required to guarantee full time evaluation of all patients presenting with cardiovascular diseases with an independent pathway for patients with suspect or confirmed COVID-19.

Methods: San Raffaele Hospital was identified as Hub for cardiovascular emergencies and the Vascular Surgery Department was remodeled to face this epidemic situation. In the outbreak period (February – April 2020), surgical treatment was reserved only to symptomatic, urgent or emergent cases. Large areas of the hospital were simultaneously reorganized to assist COVID-19 patients. Our institution started to serve a population of approximately 2.5M inhabitants.

Results: During the initial outbreak period, acute limb ischemia was the most common cause of admission in COVID-19 patients, with exceptionally high amputation and mortality rates. After this initial phase, even during recurrent pandemic waves, vascular surgery activity globally returned to normal caseload and outcomes. The only exception regarded elective open thoracic and thoracoabdominal interventions that experienced a sustained decrease due to generalized lack of intensive care unit beds.

Conclusions: The COVID-19 pandemic outbreak will be remembered in Lombardy as a cataclysm. A continuous international surveillance, co-operation, coordination and communication is crucial, in order to continue to improve protocols and be prepared to deal with possible future pandemic waves.

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Treatment of Symptomatic Carotid Stenosis During COVID-19 Pandemic

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Background: Because of the increased pressure on care facilities during the COVID-19 pandemic, a timely carotid endarterectomy (CEA) could no longer be guaranteed in many centers. Although in our center we always followed ESVS guidelines with a preferred CEA first approach, at the start of the pandemic we changed into a carotid artery stenting (CAS) first approach. Our aim for this retrospective study was to evaluate outcomes in two time periods, before and during the pandemic.

Methods: 174 consecutive patients with symptomatic extracranial carotid artery stenosis treated with CEA or CAS were divided into two groups. The first group (n=87) were treated before the pandemic (September 2018 till March 2020), and a second group (n=87) treated during the COVID-19 pandemic (March 2020 till September 2021).

Results: The period between the first neurological event and day of treatment was not significantly different in both groups. In the first group, one patient died within four months after CAS, due to carcinoma. A second patient, in the second time period, died within 2 months after CAS due to an unknown cause. There were no significant differences between both groups in all other primary and secondary outcome measures.

Conclusions: With these results, we believe that a temporary CAS first approach within our center was a reasonable solution. Primary treatment with CAS could reduce the burden of care within hospitals and ensure adequate and timely care for this patient group during a time of limited capacity. Other solutions from literature will also be discussed.

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Gastrointestinal Complications in COVID-19 patients - results from COVID Hospital Batajnica

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Background: The COVID 19 virus can affect almost any organ including the digestive system. Gastrointestinal (GI) manifestations include diarrhea, anorexia, nausea, vomiting, and abdominal pain. The prevalence of GI symptoms varies greatly, with a range between 15% and 57%. In addition, abnormal liver function tests are reported commonly in patients with COVID19 virus infection. The aim of this study was to summarize disease manifestations or complications relevant to GI and liver involvement in COVID 19 infection.

Method: Cross sectional study of patients hospitalized in COVID Hospital Batajnica.

Results: A total of 500 patients were included who were hospitalized in COVID Hospital Batajnica due to COVID 19 bilateral pneumonia. 45 % were women. The median age was 71 years (23–99 y). Vaccination was administered in 36,5% of patients. 25% of patients presented with GI symptoms, the most common of which was (anorexia 13,1%, and diarrhea 9,4%). 67,1 % had elevated AST level on admission, (mild elevation 91,65%, moderate 8,34 %). The median AST level on admission was 54 U/L (13-460), and the median peak AST level was 66 U/L. 56,5% patients had elevated ALT on admission, (73,8% had mild increase, moderate 25,4% and severe 0,7%). The median ALT level on admission was 47 U/L (23-501), and the median peak ALT level was 64 U/L. The median bilirubin level on admission was 45,5 mmol/L (18,8- 483).

Conclusion: We report a large, single-center analysis of the GI and hepatic manifestations of COVID-19. GI symptoms and an increase in liver chemistries were common in our patient cohort and may be clinically useful in stratifying the risk of disease severity.

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Ishaemic Stroke in COVID-19 Patients, Two Waves Covid Register „Sveti Sava“ Hospital

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Background: Covid-19 is a multi-organ disease, which can cause ischemic stroke due to hypercoagulation, endothelial dysfunction, and cardiac disorder.

Methods: This study included stroke patients admitted to St. Sava hospital in two Covid waves, between 15 November and 22 January 2020 and 1 September to 31 December 2021. All patients had evidence of COVID-19 at the time of stroke onset. We collected data of 433 stroke patients in

Covid-19 Stroke register (364 ischemic and 76 hemorrhagic strokes). The study aimed to evaluate the differences in outcomes between acute ischemic stroke (AIS) in Covid-19 patients during the first and second waves (Beta and Delta). We analyzed demographic data, risk factors, stroke territory and etiology (TOAST) and the outcome in 244 at first and 121 patients in the second wave (Delta strain).

Results: The median age of AIS patients associated with Covid-19 infection was 74.2 in the first group vs 72.6 years in the second group and 41,3% vs 52,4 % were females. Most common etiology was large vessel occlusions (44.4% vs. 59.7%, $p<0.064$), then cardioembolic origin (37.4% vs. 28.6%, $p<0.11$) in both groups. Stroke severity (median National Institutes of Health Stroke Scale score) was higher in the first group of patients (13.15 ± 7.2 vs 11.46 ± 7.2 , $p<0.000$). There was a higher rate of death with Delta variant infection with statistical significance (30.5% vs 47%, $p<0.002$).

Conclusion: COVID-19 is an important risk factor for the outcome of AIS patients with both Coronavirus strains, but the worst in patients infected with Delta strain.

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COVID-19 - the Reasons for Caution in Patients with Pituitary Conditions

Marko Stojanovic¹

Background: Important prognostic factors for Covid-19 disease outcome are individual immune system status and present comorbidities. Patients with various pituitary conditions exhibit an increased risk for poor outcome of COVID-19.

Methods: Literature review of influence of COVID-19 on patients with pituitary conditions.

Results: Hypopituitarism leads to increased prevalence of obesity, metabolic syndrome, sarcopenia and vertebral fractures – all of which are associated with negative Covid-19 outcome. GH deficiency (GHD) is associated both with impaired immune response and fibrinolysis. Serum IL-6 correlates with IGF-1 in acute COVID-19. In patients receiving hydrocortisone replacement, prompt adaptation of glucocorticoid doses may be needed. In patients with pituitary macroadenomas, COVID-19 may represent a risk factor for pituitary apoplexy, due to direct viral damage, or endothelial damage and hypervascularity syndrome. Acromegaly and Cushing's Disease (CD) patients are at high risk of diabetes mellitus, hypertension, obesity, and fractures - leading to more severe Covid-19 outcomes. CD leads to higher risk of infections due to immune suppression, and to higher mortality risk. Febrile response is weakened in CD, and dyspnoea is aggravated by respiratory muscle weakness. Secondary infections risk is increased and empirical prophylaxis with broad-spectrum antibiotics is advised. CD is associated with hypercoagulability, aggravating the thromboembolic burden of Covid-19. Patients with cranial diabetes insipidus (CDI) in hospital settings require strict monitoring of fluid replacement and DDAVP dosing, and access to serial laboratory work-up, to avoid dehydration and hypernatremia, as additional risk for thromboembolic complication. Some pituitary conditions such as glucocorticoid excess and GHD could compromise effectiveness of Covid-19 immunisation.

Conclusion: Pituitary conditions should trigger additional caution in Covid-19 patients.

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The Indirect Effects of COVID-19 on Patients Suffering from Peripheral Arterial Occlusive Disease (PAOD) in Malta.

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Background: COVID-19 pandemic disrupted hospital services worldwide and Malta was not any different¹.

During the first two years of the pandemic, it was felt that less patients presented to hospital with chronic limb threatening ischaemia and more patients with PAOD were needing major amputation than usual.

The aim of this study was to analyse the number of major and minor amputations, and open/hybrid revascularization procedures during the COVID-19 pandemic.

Methods: The vascular unit in Malta was established in 2007^{2,3}. The Maltese Vascular Registry⁴ and hospital data were interrogated to gather yearly data from 2002 till 2022. The number and type of procedures carried out from 2020 till 2021 (period 3: pandemic years) were compared to previous years i.e., 2002 till 2007 (period 1: pre-vascular unit) and 2008 till 2019 (period 2: vascular unit).

Results: The mean number of major amputations during the pandemic was 51. During these two years, the mean number of minor amputations and open/hybrid revascularization was 266 and 94 respectively. There was no significant difference between period 2 and period 3 (Table). When analysing the graphical trends, the rates of major amputations and open/hybrid revascularization did not continue to improve for period 3 whilst a reduction in minor amputation rate was observed (Image).

Conclusion: When compared with period 2, there was no significant difference in the number of amputations and open/hybrid revascularization during the pandemic. However, there is the possibility that due to a reduction in minor amputations and revascularization rates, the rate of major amputations did not improve further.

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Pandemic Procedures, Vascular Surgery in Sweden During the COVID-19 Pandemic

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Background: Since March 2020 when Sars-CoV-2 was declared a pandemic, there has been over 440 million confirmed cases and almost 6 million deaths at the time of writing. The Swedish National Registry for Vascular Surgery (Swedvasc) introduced 3 Covid-specific variables into its registry in April 2020 and has therefore been able to monitor how vascular surgery in Sweden has been affected by the disease.

Methods: We compiled data from the Swedvasc registry between January 2020 and December 2021 (group 1) and compared it to the two previous years prior pandemic, 2018-2019 (group 2). Comparison of means were performed regarding all vascular procedures for aortic aneurysm, carotid stenosis, peripheral arterial occlusive disease (PAOD) as well as venous insufficiency.

Results: The registered number of procedures in group 1 compared with group 2 was 5 710 vs. 5 627 for PAOD, 770 vs. 792 for carotid stenosis, 1 389 vs. 1 184 for the aortic aneurysm and 15154 vs. 11 019 for venous procedures. There were fewer lower limb amputations registered when the two groups were compared regarding patients with acute ischemia, 9 vs 146. On initial analysis there were fewer cases of ruptured aortic procedures 46 vs 109 and the ratio between asymptomatic and symptomatic carotid cases was unchanged with 96% of cases symptomatic.

Conclusions: There was no significant decrease in the number of procedures since the start of the pandemic compared with previous years.

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Stroke in Young COVID-19 Patients

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Background: Since the onset of the COVID-19 pandemic, a substantial proportion of COVID-19 patients had documented thrombotic complications and stroke. In COVID-19 patients, stroke is associated with older age, comorbidities, and severe illness.

Data supporting an association between COVID-19 and stroke in the young population without typical vascular risk factors are increasing. The true relationship between COVID-19 and stroke in young patients remains to be determined.

Methods: We reviewed patients admitted to our hospital who had SARS-CoV-2 infection and stroke from November 2020- January 2022. Among these patients, we identified those who were 55 years old and younger. We report demographics and clinical characteristics of young patients with COVID-19 and stroke.

Results: We identified 16 stroke cases in young individuals among 440 COVID-19 and stroke admissions (2.7%). Among these patients, there were 14 patients with acute ischemic and 2 with hemorrhagic stroke. The mean age was 47.7 (range 23-55 years), there were 10 male and 6 female patients. The mean NIHSS score on admission was 6.5. The patients were subtypes according to the aetiology of stroke. Large-vessel stroke was noted in 6 patients (37%), and cardioembolic stroke in 4 patients (25%), while other stroke aetiology was rare.

Conclusion: Our results showed an increased incidence of large vessel stroke in young individuals, suggesting possible endothelial dysfunction in young Covid 19 patients.

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COVID-19 Patients Requiring Critical Care in a Tertiary Critical Care Teaching Hospital

Vladimir Krajinović¹

Background: Patients with severe coronavirus disease 2019 (COVID-19) who require mechanical ventilation (MV) and extracorporeal membrane oxygenation (ECMO) have poor clinical outcomes and increased ICU mortality. Our study describes the clinical characteristics and outcomes of patients with severe COVID-19 admitted to ICU in the tertiary care teaching hospital.

Methods: Retrospective cohort study of patients admitted to ICU and respiratory ECMO center due to severe COVID-19 in Hospital for Infectious Diseases in Zagreb, Croatia from March 2020 until March 2022. Patients were characterized based on demographics, baseline comorbidities, severity of illness, medical management, laboratory markers and ventilator parameters. Major clinical outcome analyzed at the end of the study period was overall hospital mortality.

Results: Of the 527 patients included in the study, the median age was 62 years and 156 (29.6%) were female. Among patients, 521 (99%) needed respiratory support, including 285 (54.7%) who received mechanical ventilation and 169 (32.4%) who received noninvasive ventilation. Among them, data available as of March 9, 2022, 221 (42.4 %) were discharged from the ICU, and 300 (57.6%) had died in the ICU. Older patients with more comorbidities and severe ARDS defined by Berlin criteria had higher mortality rate. The majority of patients were unvaccinated (85%).

Conclusions: Despite all modern therapeutic options available in treatment of critically ill COVID-19 ARDS patients, the mortality rate was very high, especially in patients with the most severe form of ARDS even in the experienced center. Overcrowding and understaffing in ICU and lack of vaccine for SARS-CoV-2 are the major reasons for high mortality in COVID-19 ARDS pandemic.

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Important Drug-drug Interactions in COVID-19

Gordana Dragović Lukic¹

Background: SARS-CoV-2 virus is causing COVID-19, which has been declared as a global pandemic by the WHO in 2020. In this talk, the aim is to assess the risk of COVID-19 drugs and their potential for DDIs with other drugs.

Methods: A summary of interactions with COVID-19 antiviral therapies and over 500 co-medications will be also presented. Covid-19 drug interaction website will also be presented.

Results: The COVID-19 treatment guidelines vary in each country. However, a high rate of polypharmacy is expected in COVID-19 patients as the result of the treatments of existing aging-related chronic disease and other comorbidities with the prescribed drugs for SARS-CoV-2 infection. Furthermore, patients hospitalized for COVID-19 may receive other drugs for the treatment of specific symptoms, further aggravating their overall pharmacological burden and the risk for potential drug-drug interactions (DDIs).. This freely available drug interactions resource (www.covid19-druginteractions.org) is created in order to provide information on the likelihood of interactions between the drugs used for the treatment of COVID-19 and commonly prescribed co-medications.

Conclusions: Taken together, this evidence puts COVID-19 patients at extremely high risk for experiencing potentially severe DDIs during hospital stay. Thus, drug-drug interaction risk of the COVID-19 therapies should be evaluated and their interaction potential should be examined

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Life of a Gastroenterology and Hepatology Clinic in the Era of COVID-19- Single Centre Experience

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Background: Coronavirus disease 19 rapidly reached pandemic proportions. The aim of this retrospective study is to show the experience of our center during the pandemic period from a gastroenterologist standpoint, and to address questions concerning the effects of COVID-19 on inflammatory bowel disease (IBD) and chronic liver disease patients.

Methods: We retrospectively analyzed the medical records of 8569 patients admitted to the University Medical Center Zvezdara from April 3, 2019, to November 24, 2021.

Results: A total of 3247 patients (37.9%) complained of at least one gastrointestinal symptom in the course of the disease, with diarrhea being the most common one, present in 1319 patients (15.3%). Elevated aminotransferases were common in hospitalized patients, observed in 2939 (34.4%). The Aspartat aminotransferase 5-times above the upper normal limit correlated with more severe disease (HR 1.81, 95%CI 1.1-2.3). The prognosis of COVID 19 patients with fatty-liver disease and diabetes mellitus was unfavorable (HR 2.34, 95%CI 1.77-3.12). The survival and morbidity of IBD and other chronic liver disease patients hospitalized with the COVID-19 did not differ significantly from the general population. Increased use of telemedicine resulted in greater adherence of IBD patients to their therapy. It is estimated that our gastrointestinal endoscopy unit canceled approximately 40% of its elective procedures. Multiple precaution measures led to no endoscopy-related COVID-19 transmissions reported to-date.

Conclusion: COVID-19 pandemic had a profound effect on the every-day work of our unit, but with many lessons learned, could lead to even better patient care in the post-pandemic period.

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COVID-19 and Asthma Management

Rade Milic^{1,2}

Background: Asthma is the most common chronic non-communicable disease, affecting over 260 million people globally in 2019. People with asthma often have periods of worsening symptoms and worsening airway obstruction, called exacerbations (also called attacks or flare-ups), that can be fatal. On the other hand, COVID-19 is a communicable disease, affecting about 440 million people globally and more than 6 million died. Clinical presentation ranges from asymptomatic, mild cases to severe, life-threatening forms with multisystemic involvement.

Methods: Overview of available evidence related to COVID and asthma management.

Results: The impact of acute COVID-19 on people with asthma and vice versa was initially unknown? The patients with asthma don't have increased risk of COVID-19; also, the risk of severe COVID-19 and death isn't increased in people with well-controlled, mild-to-moderate asthma. However, the risk of COVID-19 death was increased in people who had recently needed oral corticosteroids for their asthma and in hospitalised patients with severe asthma. During COVID-19, many countries reported a reduction in asthma exacerbations and influenza-related illness.

Conclusions: The possible reasons for this are preventive measures such as hand-washing, masks and social/physical distancing that reduced the incidence of respiratory infections, including influenza. In one study of hospitalised patients aged ≥50 years with COVID-19, ICS use in those with asthma was associated with lower mortality than in patients without an underlying respiratory condition. Many countries and professional associations recommend COVID-19 vaccination for people with asthma, including those with severe asthma. GINA recommended avoiding spirometry in patients with confirmed/suspected COVID-19. Alternatively, PEF monitoring at home can be recommended.

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Characteristic and outcomes of treatment of acute myocardial infarction in patients with COVID-19; Experiences from the Coronary Care Unit COVID hospital Batajnica

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Background: Previously published data have indicated that COVID 19 infection significantly worsens the clinical course of patients with acute myocardial infarction.

Purpose: To describe clinical characteristics and in-hospital mortality patients with acute myocardial infarction (AMI) complicated with COVID 19 infection.

Methods: A retrospective study of 189 patients with acute myocardial infarction with/out elevation ST segment (STEMI/NSTEMI) and concurrent COVID 19 infection who were treated in Coronary Care Unit (CCU) in COVID-Hospital Batajnica in period February 18, 2021, and March 10, 2022. Demographic, clinical and angiographic data were collected from hospital electronic health record system-HELIANT and analyzed using SPSS, version 21.

Results: Our study enrolled 189 patients; the mean age was 69.7 and 65.5% were male. They are very complex patients with high incidence of comorbid conditions – hypertension (83.1%), diabetes mellitus (34.2%), atrial fibrillation (12.2%), anemia (34.8%), chronic kidney disease (44.9%) preexisting cardiovascular disease-myocardial infarction (16.7%), cerebrovascular insult (7.4%), vascular disease (12.2%) and previous revascularization – coronary artery bypass surgery - CABG (4.8%), percutaneous coronary intervention -PCI (15.1%). Patients with STEMI were more frequently hospitalized in CCU than patients with NSTEMI (60.3% vs 39.7%).

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One hundred nine (57.6.3%) patients underwent coronary angiography and PCI was performed in 73.4% of patients. The one-vessel disease was registered in 41.4% of patients. The clinical course was complicated by the development of pneumonia in 81.4% of patients and assisted ventilation was administered to 37.5% of patients.

In-hospital mortality in patients with AMI and COVID 19 infection was 42.3%.

Conclusions: COVID 19 infection in patients with AMI is associated with complicated clinical courses and increased in-hospital mortality.

Cardiac Arrhythmias After COVID-19

Mujovic Nebojsa¹, Marinkovic Milan¹

Background: Various cardiac arrhythmias of new onset may complicate acute COVID infection with incidence rate of 15-20%. The occurrence of arrhythmia could be related to myocardial inflammation and could be associated with higher rates of thromboembolic events and mortality. However, highly symptomatic sinus tachycardia, recurrent atrial fibrillation and ventricular arrhythmias may persist even after full recovery from COVID, but their mechanism, optimal treatment and long-term clinical significance is underreported.

Methods and results: Herein, we present two patients from our department who were evaluated and treated for complex cardiac arrhythmias occurring 3 months after serious COVID infection. The middle aged man was admitted for treatment of fast un-sustained polymorphic ventricular tachycardia accompanied with syncope. After complete noninvasive and invasive cardiac assessment, the full suppression of ventricular arrhythmia was achieved using beta-blocker and oral amiodarone. The second patient was a 57-year old lady with post-COVID paroxysmal atrial fibrillation, refractory to propafenone and amiodarone, and with no structural heart disease. The long-term thromboembolic risk and optimal time for invasive treatment of atrial fibrillation by catheter ablation is evaluated and the review of available data from literature is given.

Conclusions: Although acute COVID infection is commonly associated with transitory atrial and ventricular arrhythmias, the prevalence of persistent cardiac arrhythmias post-COVID seems to be low. However, in selected patients cardiologist may encounter complex cardiac arrhythmias several months after COVID infection, the prognostic significance of which is not yet well understood. In these patients, detailed cardiovascular evaluation and conventional antiarrhythmic treatment seem to be safe and effective.

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Characteristics and Outcomes in Patients with Acute Cardiovascular Conditions and Covid-19 Admitted to the Coronary Care Unit in Covid-Hospital Batajnica

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Background: COVID-19 is associated with worse prognosis in patients with acute cardiovascular disorders (ACVD). Data on patients with ACVD and COVID-19 in Serbia are sparse.

Purpose: to describe the clinical characteristics and in-hospital mortality in patients hospitalised for ACVD, excluding acute myocardial infarction, in the Coronary Care Unit (CCU) of the COVID-hospital Batajnica.

METHODS: this retrospective study included consecutive patients with COVID-19 admitted between 18.02.2021 and 11.03.2022 in the CCU. The analysis was restricted to patients with ACVD, excluding acute myocardial infarction. Data on the demographic and clinical characteristics, comorbidities, and in-hospital, all-cause mortality were obtained from the "Heliant" electronic health records system.

Results: of a total of 353 patients, 164 (46,6%) were hospitalised for ACVD (mean age 68.7±12.7 years, 57% male). ACVD included: acute heart failure (35.6%), cardiac arrhythmias (atrial fibrillation, 42.7%, ventricular tachyarrhythmias, 10.4%, complete AV block, 6.7%), pulmonary embolism (14.6%), myocarditis/pericarditis (1.8%) and Takotsubo syndrome (0.6%). The most frequent comorbidities were: hypertension (71.3%), kidney disease (48.2%), anaemia (42.7%), diabetes (33.5%), prior heart failure (30.5%; ischaemic aetiology, 34%) prior stroke (10.4%) and vascular disease (11.6%). Pneumonia was documented in 75.6%, with the requirement of invasive ventilation in 73.1%. In-hospital death of any cause was documented in 36% of patients.

Conclusions: heart failure and cardiac arrhythmias were the most prevalent ACVD in patients admitted to the CCU with COVID-19. Those patients had a high burden of comorbidities and pneumonia, frequently requiring ventilatory support. In-hospital death-rate was high, occurring in more than a third of patients.

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Uro-oncological Aspects of the COVID-19 Pandemic

Zoran Dzamic^{1,2}

The COVID-19 pandemic has led to great difficulties in treating patients with genito-urinary malignancies.

Due to the reorganization of the urological service and the engagement of staff and hospital capacities for the treatment of COVID-19 patients, a significant number of surgical interventions of patients with uro-oncological diseases have been postponed or canceled. In this situation, it is necessary to primarily treat patients with high-risk tumors for progression, which include: muscle-invasive bladder cancer, high-grade upper urothelial cancer, certain high-stage kidney tumors, testicular tumors, and penile cancers. Also, a special problem is the fact that these patients are at high risk for complications of coronavirus infection - both due to malignant disease or chemotherapy treatment, and likewise since many of them are of older age. They undoubtedly belong to the group with a significantly increased risk of morbidity and mortality if infected with the SARS-CoV-2 virus.

The impact of the COVID-19 pandemic is not exclusively reflected in everyday uro-oncological clinical practice. In the United States alone, 10,174 clinical trials were suspended or canceled in April and March 2020. It is well known that randomized controlled studies are the backbone of progress in modern oncology, so the question arises as to what long-term consequences this will have on the future treatment of cancer patients.

Thus, we can conclude that in the state of the COVID-19 pandemic, uro-oncological patients represent a high-risk group for the progression of malignant disease, due to the inability to timely therapy, on the one hand, but also a group of immunodeficient patients susceptible to infection and severe SARS-CoV-2 infection mortality, on the other hand. This emphasizes the importance of a multidisciplinary and personalized approach to the patient, along with his education, with a goal to achieve the optimal result of treatment.

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Use of Antibacterial Agents, Clinical and Microbiological Outcome of COVID-19 Patients with Pneumonia in the Intensive Care Unit

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Background: Protocols for antibiotics in COVID patients have ranged from wide-spread use to a more rational approach, with a trend towards de-escalation. Our study aimed to assess the use of antibiotics in treating hospitalized patients with pneumonia in intensive care units (ICUs) at the third-level hospital before and during the COVID19 pandemic.

Methods: We conducted a retrospective comparative observational study that included patients treated in the ICUs from July to December 2019 and 2020 (COVID and non-COVID patients, N = 89 + 159 = 248). Data from hospital medical records were monitored: demographic data, clinical and microbiological parameters, and treatment outcomes.

Results: Non-COVID patients were significantly older, their hospitalization was shorter, and they were less frequent on mechanical ventilation. They were also less likely to have hospital-acquired pneumonia, and their mortality was lower. Clinical disease severity and comorbidity scores were generally significantly higher in non-COVID patients except for the alveolar-arterial oxygen gradient. Gram+ bacteria were less frequently isolated in non-COVID patients, as were CRE, MDR, and XDR strains of Gram-bacteria and bacterial isolates in blood culture. E. coli and K. pneumonia were isolated more frequently in non-COVID patients, and A. baumannii and CNS less frequently, with an increase in resistance to most antibiotics. The total consumption of antibiotics and the hospital budget for antibiotics increased significantly during the COVID period.

Conclusions: Misuse of antibiotics in COVID patients can have substantial harmful consequences. Rationalizing antibacterial chemotherapy in these patients is a priority task for the entire health service.

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COVID-19 Pandemia and Impact on NSSI And Suicidal Behavior on Adolescent Population Within Psychiatric Institution

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Background: NSSI (non suicidal self injuries) and suicidal behaviours among adolescents are not rare phenomena. Adolescents living in modern society experience many stressors and it was estimated that by 2020, there would be 15–30 million teenagers who engage in NSSI. Compared to adults they have more vulnerability factors, which increases the impact of the pandemic on their lives. The latest studies have reported that the pandemic has caused adolescents to be unable to meet friends, unable to participate in outdoor activities, and unable to engage in school activities, which may have continuous negative effects on their mental health.

Methods: Our study was a retrospective, cross-sectional analysis of medical record data retrieved from the electronic medical record system of the Institute of Mental Health in Belgrade, Serbia. The aim was to evaluate the risk of self-harm, overdose, and all-cause mortality among adolescents and young adults during the COVID-19 pandemic. We analyze three consecutive years – 2019, 2020 and 2021, the first referral patients and collected data from medical documentation of 1129 patients, age 10 to 18 (mean age 14,17; 57,8% girls)

Results: Compared to 12,6% in the year prior to the pandemic (2019), number of adolescents with NSSI behaviors remained on the approximately same level in the year following the outbreak (11,8%)(2020), and significantly increased in the second year (28,8%)(2021). Number of adolescents with suicidal behavior has also significantly increased in the second year (11,9%) (2020), compared to pre-pandemic period (7,3%) (2019) and the first year (7,0%)(2020). A weak, but significant association between childhood abuse experiences and NSSI was found (Crammer's V=0,102, p=0,015).

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Conclusion: Mental health challenges in children, adolescents, and young adults are real and widespread. Even before the pandemic, an alarming number of young people struggled with feelings of helplessness, depression, NSSI and thoughts of suicide. The COVID-19 pandemic further altered their experiences at home, school, and in the community, and the effect on their mental health has been devastating. The future wellbeing of our country depends on how we support and invest in the next generation, recognition that mental health is an essential part of overall health, than we need to empower youth and their families to recognize, manage, and learn from difficult emotions and to ensure that every child has access to high-quality, affordable, and culturally competent mental health care.

Comparison of Characteristics and Outcomes of COVID-19 in Patients with Lymphoproliferative Disease and in the General Population - Experience From Three University Centers

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Background: Patients with hematological malignancies (HM) and covid-19 have a poor outcome as a consequence of inadequate immunity.

Aim: This study analyzes clinical characteristics, inflammatory parameters, outcomes of covid-19 patients with lymphoproliferative disease (LPD) and compares them with characteristics of covid-19 patients in the general population (GP).

Methods: This is a prospective multicenter observational study conducted in 3 covid hospitals in Belgrade that included hospitalized patients with covid-19: 161 with LPD and 162 patients from the GP.

Results: There were 54(33.54%) patients with chronic lymphocytic leukemia, 72(44.72%) with Non-Hodgkin lymphoma/Hodgkin lymphoma and 35(21.74%) with multiple myeloma. The LPD and GP group differed significantly in relation to age, gender, presence of comorbidities, COVID score. Patients with LPD had significantly lower levels of hemoglobin, lymphocytes, platelets, higher level of inflammatory parameters on admission and maximal values compared to the GP group. Mortality rate was higher in the LPD group (28% vs.16%) patients. The mortality rates in patients among the LPD group were: MM (45.71%), CLL (27.9%) and NHL/HL (19.4%) patients. Independent factors related to survival were D-dimer, hemoglobin and COVID score in the LPD group, while maximal value of CRP, hemoglobin, leukocytosis and age in the GP group.

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Summary: Patients with LPD have significantly higher inflammatory parameters and worse outcomes compared to patients from GP. Independent factors related to survival are high values of D dimer, moderate/critical COVID score and anemia in the LPD group, while CRP, anemia, leukocytes and older age are identified in the GP group.

The Correlation Between Gastrointestinal Bleeding and Covid Infection – the Experience of Surgery Clinic, University Hospital Center Zemun

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Background: Gastrointestinal(GI) bleeding In COVID-19 positive patients may be a consequence of the virus's effect on the intestinal mucosa, disseminated intravascular coagulation and comorbidities. Therapy used in the prevention of thrombogenesis in COVID-19 positives may be associated with bleeding.

Review and analysis of patients with moderate and severe clinical picture of COVID-19 who suffered gastrointestinal bleeding in order to find a link between therapy and the cause of bleeding in order to prevent them.

Methods: The research was designed as a retrospective study that included 91 patients hospitalized in the COVID Hospital CHC Zemun, with moderate and severe covid disease, who had symptoms and signs of GI bleeding in the period from march, 2020 to may 2021. The study included 53 patients who had symptoms and signs of upper GI bleeding and 38 patients with down GI bleeding. Results: In order to determine the cause of bleeding, initial diagnostics and therapy in the form of gastroscopy and MDCT was performed in 89 patients (97.8%). The most common cause of bleeding were gastric erosions (68.6%) All patients included in the study had a moderate and severe clinical form and they used thromboembolic prophylaxis before and during the hospitalization. Out of 91 patients, 83 (91.21%) were treated conservatively, while 8 patients (8,79%) were treated surgically.

Conclusion: The prevalence of GI bleeding in patients hospitalized for COVID-19 pneumonia is more than 1%. From the obtained results, we can conclude that there is a connection between the occurrence of bleeding and COVID-19 therapy.

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Surgical Treatment of Thromboembolic Complications in Patients With Moderate and Severe COVID-19 - The Experience of Surgery Clinic, University Hospital Center Zemun

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Background: The new virus strain SARS-CoV-2, besides high virulence, leads to polymorphic disorders and numerous complications on multiple organ systems. One of the main characteristics of the virus is the tendency to develop thromboembolic complications, which are often lethal. The aim of our study is to present our experience in the surgical treatment of thromboembolic complications in patients with moderate and severe COVID 19 infection.

Methods: Our study included 42 patients with moderate and severe covid disease hospitalized in the COVID Hospital CHC Zemun. Patients are treated for the consequences of thromboembolic complications caused by the SARS-CoV-2 virus. In our retrospective study 42 patients participated in the period from March 2020 to May 2021. Patients were divided into a group with diagnosed gastrointestinal ischemia and a group with diagnosed acute limb ischemia.

Results: In both groups, male were predominantly represented. The first group consisted of 9 patients, all of them had a clinical finding of acute abdomen and ileus, while 7 of them had a severe CT image of bilateral pneumonia. Mortality from the underlying disease in both groups was high.

Conclusion: Moderate and severe forms of SARS-CoV-2 infection are associated with an inflammatory response leading to endothelial dysfunction accompanied by a high incidence of thromboembolic complications despite pharmacological prophylaxis. The current consensus supports the use of anticoagulants in all hospitalized patients with moderate to severe disease, as well as in critically ill patients.

Key words: COVID19, SARS-CoV-2, Thromboembolic complications, Thrombosis

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Pregnancy and COVID-19: Our Perspective

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Background: Since the new SARS CoV-2 virus was identified for the first time in March 2020, Hospital for Gynecology and Obstetric of the University Hospital Center Dr Dragiša Mišović, was officially transformed for two months to national obstetric COVID-19 center. From Jun 2020 until now, we have worked in a dual regime, divided our obstetric department in ward for COVID-19 positive women and ward for COVID-19 negative patients. At the admission all pregnant women are tested and according to the results hospitalized in one of the delivery wards.

Methods: From June 2020 to December 2021, 3000 pregnant women with confirmed or suspected SARS-CoV-2 infection at any stage of pregnancy were examined at our COVID-19 ambulance, 650 were hospitalized at any stage of pregnancy and 285 have been delivered at our COVID19 ward.

Results: The average age of hospitalized pregnant women at any stage of pregnancy was 31.4 years. At the time of COVID19 diagnosis the average gestation stage was 34.3 +/- 3.3 gestation weeks. 5.3 +/- 1.4 days were the average duration of hospitalization in the standard care unit, whereas pregnant women who required intensive care unit treatment spent around 22 days at the hospital. 43% of hospitalized women required oxygen therapy, fortunately only 2.4% were on some kind of mechanical ventilation. 7 patients died from COVID19 complications. 5% of pregnancy was terminated in the first and second trimester. Thromboembolic complications were identified in 3 cases. The average gestation age at the time of pregnancy termination was 37.1, one third of pregnancy was terminated by cesarean section.

Key words: COVID19, pregnancy, compilation

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The most common surgical complications in the Respiratory Center of Clinical Hospital Center of Zemun during the COVID-19 pandemic

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Damir Jašarović², Branko Lukic¹

Introduction: The Respiratory Center of the Clinical Hospital Center Zemun treated the most severe Covid 19 patients who were respiratory dependent and who were treated with invasive and non-invasive modes of artificial ventilation. Surgeons from various fields were treated for surgical complications.

Methods: In the Respiratory Center, in the period from March 2020 to May 2021, a total of 1,008 patients were treated in three waves of the Covid 19 epidemic over 11 months. In this paper, we analyzed various surgical complications and their impact on the course and outcome of treatment of patients in the Respiratory Center.

Results: The most common surgical complication was pneumothorax, in which 39 patients were treated with thoracic drainage. 35 patients had thrombosis of the arteries of the lower extremities, which resulted in 25 amputations of the lower extremities. 3.76% (38) of all patients had bleeding from the upper parts of the digestive tract, of which 7 patients had to be operated on. Unoperated patients were treated conservatively. In 35 patients (3.46%) we had bleeding from the lower parts of the digestive tract. 22 (2.18%) patients had retroperitoneal hematomas which in 4 cases were treated by operative evacuation and hemostasis. In 25 patients (2.47%) we had different forms of intracranial hemorrhage, which is why 16 patients underwent surgery. In 9 cases of abundant hematuria (3.46%) was treated by transurethral resection. Tracheostomy was performed in 31 patients.

Conclusion: Patients with surgical complications had a significantly worse outcome than other patients in the Respiratory Center CHC Zemun.

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Dynamic changes of liver function indicators in patients with different phenotypes of COVID-19

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Background and Aim: Liver involvement is common in hospitalized patients with COVID-19 and possibly associated with disease severity. The aim of this retrospective study is to investigate the dynamics of liver function parameters in COVID-19 infected patients with different clinical presentations.

Materials and Method: Our single-center study involved 8300 patients with confirmed COVID-19, admitted to the University Medical Center Zvezdara from April 3, 2019, to November 24, 2021. Clinical classification of patients was based on symptoms, laboratory and imaging features. Patients were divided in four phenotypes: asymptomatic, mild-common, seriously ill, and critically ill. A linear regression analysis alongside a general additive mixed model was performed to investigate the changes in liver function parameters with hospitalization time in defined groups.

Results: The seriously and critically ill groups of patients were significantly older and had a higher percentage of patients with diabetes mellitus. The AST levels, as well as Fibrosis-4 indices, were significantly higher in the critically ill group of patients, when compared to other groups. Although the baseline levels of ALT were not statistically different between the four groups of patients, it showed a tendency towards an increase in mild-common groups and a decrease in other groups. The daily decrease of ALT (regression coefficient 1.31; 95%CI: 1.02–1.94) and albumin levels (regression coefficient 1.12; 95%CI 0.845–1.85) was even more pronounced in the critically ill.

Conclusion: The monitoring of liver-injury indicators, particularly ALT and albumin, could be important in the prediction of disease severity and guide us towards more decisive treatment options.

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COVID-19 Related "Pneumo" Complications: Regional Hospital Experience

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Background: Coronavirus disease 2019 (COVID-19) presents from mild infection to severe pneumonia and "pneumo" complications such as pneumothorax (PNTX) and pneumomediastinum (PNM). The aim was to discuss the incidence, characteristics, and outcomes of PNTX/PNM in COVID-19 pneumonia.

Methods: This was a prospective observational study. We enrolled adult patients with COVID-19 pneumonia treated at The Covid hospital "Miseluk", University Clinical Center of Vojvodina, Serbia from 1st September to 2nd December 2021. We collected data on demographic, clinical characteristics, and outcomes of patients with COVID-19 pneumonia and PNTX/PNM.

Results: From total number (3117) of patients 44 (1.41%) had PNTX and/or PNM; mean age 63.7±14; dominantly males (n=29, 65.91%). 4 (9.09%) patients had chronic pulmonary disease (one asthma, three chronic obstructive pulmonary disease of which one combined with bronchiectasis) and 15 (34.09%) were active or ex smokers. Clinical characteristics were that 31 (70.45%) had PNTX, 6 (13.64%) had PNM and 7 (15.91%) patients had combined PNTX and PNM. PNTX isolated or combined with PNM was right sided in 23 (52.7%), left sided in 12 (27.27%) and bilateral in 3 (6.82%) patients. PNTX/PNM was associated with subcutaneous emphysema in 4 (9.09%) cases. Approximately two-thirds of patients were ventilated (n=1, 2.27% non-invasively and n=29, 65.91% invasively). The remaining patients were oxygen-supported only: 5 (11.36%) conventional oxygen support, 8 (18.18%) high-flow nasal cannula. 35 (79.55%) out of the total 44 cases were deceased during hospitalization.

Conclusions: Incidence of PNTX and/or PNM was high, it was not associated with underlying pulmonary diseases or smoking, but with high in-hospital mortality.

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Imaging Findings of COVID-19 Pneumonia

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Background: Coronavirus disease (COVID-19) is an infection caused by the SARS-CoV-2 virus that is usually manifested as bilateral interstitial pneumonia.

Methods: All CT scans were obtained using the Canon, Aquillion One (TSX-301C), 320 row MDCT System (Canon, Tokyo, Japan). The radiographic images were obtained using the Shimadzu Sonialvision G4 R/F system.

Results: There are significant imaging characteristics that differentiate the COVID-19 viral pneumonia from other infections, including „ground-glass” opacifications (GGO), “crazy paving”, reticular inter-/intrapulmonary septal thickening, consolidations and “air bronchogram”. In addition to this, pathological findings can also be found in the airways, pleura, subpleural space, vascular structures and lymph nodes. These findings can vary over time and indicate the stage of the condition. COVID-19 has four CT stages - early, progressive, peak and resolution stages, all of which have their own specific morphological characteristics.

Conclusions: Radiographic findings in COVID-19 pneumonia are not sensitive in the beginning of the infection, but are useful for following-up imaging. Initially, CT imaging is one of the most sensitive tests for the detection of infection, more sensitive than RT-PCR testing.

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The Impact of COVID-19 on Adult Cardiac Surgery

Ergun Demirsoy¹

The coronavirus disease 2019 (COVID-2019) pandemic has had an unprecedented impact on health care, leading to marked global morbidity and mortality.

Cardiac surgery patients have an increased risk of complications and require vital limited resources such as intensive care beds, also required by Covid-19 patients.

In order to preserve and re-directed limited resources and health care staff for treatment of patients with Covid-19, cardiac surgery programs were needed to adapt to new challenges.

In this context, guidelines have played a critical role in providing best medical care during surges of the patients with Covid-19, in balancing the risks of deferring non-emergency surgical procedures, and minimizing potential exposure to Covid-19. This includes stratifying the patients based on the urgency and medical condition.

This review aims to summarize in the light of existing literature on the impact of Covid-19 on cardiac surgery and suggests safe management of cardiac surgical interventions despite the increasing number of Covid-19 cases.

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The Relation of Redox Biomarkers with Inflammatory, Multiorgan Impairment Biomarkers and CT Findings in COVID-19 Pneumonia

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Background: Although the original data on systemic oxidative stress in COVID-19 patients have recently started to emerge, we are still far from a complete profile of changes in patients' redox homeostasis. We aimed to assess the extent of oxidative damage of proteins, lipids and DNA during the course of acute disease, as well as their association with CT pulmonary patterns.

Methods: In order to obtain more insight into the origin of the systemic oxidative stress, the observed parameters were correlated with inflammatory biomarkers and biomarkers of multiorgan impairment. In this prospective study, we included 58 patients admitted between July and October 2020 with COVID-19 pneumonia.

Results: Significant changes in malondialdehyde, 8-hydroxy-2'-deoxyguanosine and advanced oxidation protein products levels exist during the course of COVID-19. Special emphasis should be placed on the fact that the pattern of changes differs between non-hospitalized and hospitalized individuals. Our results point to the time-dependent relation of oxidative stress parameters with inflammatory and multiorgan impairment biomarkers, as well as pulmonary patterns in COVID-19 pneumonia patients.

Conclusions: Correlation between redox biomarkers and immunological or multiorgan impairment biomarkers, as well as pulmonary CT pattern, confirms the suggested involvement of neutrophils networks, IL-6 production, along with different organ/tissue involvement in systemic oxidative stress in COVID-19.

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Tuberculosis and COVID-19: pandemic challenge in a low burden country

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Background: Republic Serbia belongs to low burden tuberculosis (TB) countries with an incidence rate of 9/100.000 according to the latest data. The impact of COVID-19 on TB results in reduction of the number of notified TB cases, management as well as delayed diagnosis with advanced forms of the disease.

Methods: Retrospective analysis of 49 patients with active and previous TB and COVID-19 treated in COVID hospital Batajnica in Belgrade and Special hospital for pulmonary disease „Ozren“ Sokobanja in the period from 6th March 2020 to 1st March 2022 was performed.

Results: There were 67.3% male and 32.7% female, 2.7% aged 18-44, 38.8% 45-64 and 28.6% older than 65. Concomitant diseases were: cardiac in (20.4%), respiratory in 36.7%, diabetes in 16.3% and malignancy in 4.1%). There were 83.7% new TB cases while 16.3% previously treated. Bilateral pulmonary non-cavitary lesions were dominant radiologic findings (46.9%). All patients (100%) were microbiologically confirmed TB. Most of the patients had pan susceptible TB (95.9%), while 4.1% had mono resistant TB. Average duration of hospitalization was 11.7 days. COVID-19 treatment included antivirals: favipiravir in 24.5%, molnupiravir in 30.6%, remdesivir in 8.2% pts; immunomodulators: glucocorticoids in 40.8%, casirivimab/imdevimab and baricitinib in 2% pts each and anticoagulants in 71.4% pts. Only 16.3% pts were fully vaccinated (Sino-pharm BBIBP-CorV in 8% pts, Pfizer-BioNTech in 6% and AstraZeneca in 2%). Almost all the patients were cured 98% pts, while lethal outcome was noticed in 2%.

Conclusions: Serbian TB/COVID-19 cohort achieved a very high treatment success rate, although concomitant disease represented a treatment challenge. Prevention efforts to avoid SARS-CoV-2 infection in TB patients and excessive morbidity and mortality should include increase in vaccination coverage.

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Risk Factors for Poor Outcome and Therapeutic Challenges in Hospitalized Patients With Concurrent Chronic Lymphocytic Leukemia and COVID-19 – Experience of Three Serbian University Centers

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Background: Patients (pts) with chronic lymphocytic leukemia (CLL) and concurrent COVID-19 have poor outcome, with reported case fatality rates (CFRs) up to 40%, but there is still paucity of data on identifying risk factors of their adverse outcome.

Methods: Demographic, patient-related, CLL-related and Covid-19 related risk factors in 81 pts hospitalized in Clinical Hospital Center (CHC) Zemun, CHC Bezanijska kosa and CHC Zvezdara from 15 March 2020 to 31 December 2021 were evaluated.

Results: For all 81 pts CFR was 32.1%. Age (median 68yrs;range 45-90yrs) and sex (61 male) had no influence on outcome. Pts with Charlson comorbidity index>4 (29/81;35.8%) had significantly higher CFR (p=0,025). CLL treatment history (treatment naïve, active treatment, remission) had no impact on CFR. High levels of lactate-dehydrogenase (>2xUNL:6/81;7.41%pts), D-dimer>1000ng/mL (36/81;44.4%pts), and C-reactive protein>100mg/L (31/81;38.27%pts) were laboratory parameters associated with adverse outcome (p-values 0.002, 0.039 and <0.001). Severe Covid-19 score had 35(43,2%)pts, and critical 19(23.5%)pts. COVID-19 was treated according to National guidelines, and none of therapeutic approaches had impact on CFRs. Concomitant bacterial infection had 43/81(53.09%) pts leading to higher CFR (p<0.001). The need for supplemental oxygen (58/81;71%) (p<0.001), and ICU admission (25/81-30.9%;19/25 mechanical ventilation)(p<0.001) elicited higher CFR. In multivariate analysis, the bacterial coinfection and ICU admission proved to be the most significant adverse parameters influencing CFR (p=0.012).

Conclusions: Our study proved the dismal outcome of CLL pts with concurrent Covid-19. That could be mainly attributed to the high proportion of bacterial coinfections reflecting their frailty and susceptibility to both viral and bacterial infections.

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Dialysis Patients' Mortality During COVID-19 Pandemic: a Single Center Experience

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on behalf of Nephrology study group

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Background: The Coronavirus-19 disease (Covid-19) has been associated with multiple organ failure in some patients, which may lead to acute kidney injury (AKI) or acutisation of previously known chronic kidney disease (aCKD). Additionally, patients requiring chronic haemodialysis (HD) are considered particularly vulnerable due to altered immune response. This study aimed to evaluate mortality rates in Covid-19 positive patients who received haemodialysis during hospitalization.

Methods: This retrospective study included Covid-19 positive patients who were hospitalized and underwent haemodialysis in Clinical Hospital Center Zemun between March 2020 and March 2021. Patients were distributed in three groups depending on their renal status: AKI, HD, or aCKD. Demographic data and laboratory analyses were derived from the patients' electronic record.

Results: Total of 176 patients were included. The majority (73.3%) was in the chronic hemodialysis group, while 15.9% had AKI and 10.8% aCKD. The oldest patients were in the AKI group, with an average age of 70±15 years, although the difference did not reach significance. Bilateral pneumonia was a predominant radiography finding, independently of the study group ($p=0.168$). Clinical presentation was mostly defined as mild in the HD group, whereas critical in AKI and aCKD group. AKI patients had significantly higher sepsis rate (21.4%, $p=0.027$) and respiratory insufficiency (78.5%, $p=0.000$) compared to others. Mortality rate among the overall population was high (34.6%). The worst survival rate was observed in AKI, while the lowest in HD patients, 82.1% and 22.5%, respectively ($p=0.000$).

Conclusions: Patients who develop AKI during COVID-19 have higher mortality rate compared to patients with previously acknowledged CKD, irrespective of pre-hospital initiation of dialysis.

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COVID-19 in Children

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Background: From the beginning of the coronavirus disease 2019 (COVID-19) pandemic it became evident that children infected with the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) remain mostly asymptomatic or mildly symptomatic.

Methods: Literature review of latest evidence.

Results: The true prevalence of asymptomatic SARS-CoV-2 infection is most likely underestimated, as asymptomatic children are less frequently tested. In general, children with COVID-19 are at lower risk of hospitalization and life threatening complications. Nevertheless, cases of severe disease or a post-infectious multisystem hyper-inflammatory syndrome named multisystem inflammatory syndrome in children (MIS-C) have been described. Multisystem Inflammatory Syndrome in Children (MIS-C) is a new phenomenon reported worldwide with temporal association with Covid-19. In contrast to acute COVID-19 in children, MIS-C appears to be a condition of higher severity with 68% of cases having required critical care support. In addition, studies indicate that school closures have a limited impact on SARS-CoV-2 transmission, much less than other social distancing measures. The past months new SARS-CoV-2 variants emerged with higher transmissibility and an increased impact on morbidity and deaths. Lastly, results from COVID-19 vaccine trials indicate very good efficacy and tolerability in children.

Conclusions: The benefits of pediatric COVID-19 vaccines are clear. Vaccination protects children, decreases spread to families and communities and ensures educational continuity.

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Left Ventricular Thrombus Caused by COVID-19 in Patients with Preserved Left Ventricular Systolic Function

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Background: Thrombosis, especially venous thromboembolism, is a complication often associated with coronavirus disease 2019. However, there have been relatively few reports of arterial thrombosis. Here, we describe a case of non-severe COVID-19 in a patient with preserved left ventricular function.

Methods: A 60-year-old man had cough, fatigue, palpitations and fever 11 days before admission. After a positive PCR test for SARS-CoV-2 he was referred to hospital. He had regular echocardiography with preserved left ventricular systolic function one month before.

Results: Patients have arterial hypertension. After admission, non-invasive lung ventilation was started. The patient was intubated on the 3rd day of hospitalization. The patient was placed in a prone position. Thrombocytopenia was observed in laboratory analyzes. The gas exchange improved and the patient has been turned to the supination position. Cyanosis could be seen on the big toe of the left foot, the second and the third toe. Echocardiographic examination showed the left ventricle with preserved systolic function. At the top of the left ventricle, we saw hyperechoic formation measuring 4.9 cm x 1.9 cm, which floated freely in the lumen of the left ventricle. The patient was hypertensive all the time. Due to the suspicion of secondary hypertension, the values of ACTH, cortisol, metanephrine and normetanephrine were sampled. The values arrived high and the alpha blocker was included in the therapy. Fondaparin therapy was continued at therapeutic doses. The patient was hemodynamically unstable all the time. On the twenty-second day of hospitalization, a percutaneous tracheostomy was performed.

Sedation was stopped and we were started with weaning from MVP. Weakness of the right half of the body was observed. CT of the endocranium was performed, sub-acute/chronic ischemic lesions were found. On CT of the abdomen, heterogeneous, clearly limited, irregular change was described in the left adrenal gland. The pa-

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tient was gradually transferred to spontaneous breathing. Two weeks after we started with Fondaparinux therapy, the previously described change in the top of the left ventricle was no longer visible. On the 45th day of admission, the patient was transferred to the Clinic for Rehabilitation, and was released home after 80 days of hospitalization.

Conclusion: Echocardiography revealed a left ventricular thrombus. Anticoagulant treatment diminished the thrombus, and the patient was recovered and discharged from hospital. Although a left ventricular thrombus is considered a rare COVID-19 complication.

Non-invasive lung ventilation and prone position of patients with COVID 19. How long? – Case report

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Background: Critically ill patients admitted to hospital following SARS-CoV-2 infection often experience hypoxic respiratory failure and a proportion require invasive mechanical ventilation to maintain adequate oxygenation. The combination of prone positioning and non-invasive ventilation in conscious patients may have a role in improving oxygenation. A prone position in combination with NIV can improve oxygenation in COVID-19 patients.

Methods: A 40-year-old man had a cough, fatigue, shortness of breath, and fever 4 days before admission. After a positive PCR for SARS-CoV-2 he was referred to hospital. Patients has arterial hypertension, diabetes and obesity. After admission, oxygen therapy was started with a low oxygen flow. The radiograph shows bilateral pneumonia. Oxygen saturation and adequate gas exchange are not achieved. Patient is started oxygenation through HFNC.

The progression of the previously described radiological changes and bed condition of the patient requires a higher degree of respiratory support. He was transferred to the ICU on the 8th day of his illness. The patient was agitated, febrile, hypoxic, tachypnea. Immediately after admission, non-invasive lung ventilation was started and the patient was placed in a prone position. The patient spent more than 12 hours in the prone position during the day, all the time on non-invasive lung ventilation. Progression of the previously described inflammatory changes can be seen. The patient maintains the maximum acceptable oxygen saturation in the prone position.

On the 15th day of hospitalization, non-invasive ventilation and prone position, there is a gradual improvement in the general condition of the patient as well as regression of the previously described radiographic changes.

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Results: The patient was discharged from the ICU on the 20th day of hospitalization, and he was discharged from hospital after one month of admission to the hospital.

Conclusion: Prone positioning has been often adopted to improve gas exchange in mechanically ventilated patients with moderate to severe refractory hypoxia associated with acute respiratory distress syndrome (ARDS) This can be achieved without significant side effects and, in particular, in patients with a sustained response, intubation can be avoided.

Gastrointestinal Symptoms in Severe Acute Respiratory Syndrome SARS CoV-2 Infection

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Background: SARS-CoV-2 is predominantly localized in lower respiratory tract so most of the patients develop severe viral pneumonia, but it may infect the gastrointestinal (GI) tract, for which it has a marked tropism. GI tract involvement is associated with nausea, vomiting, abdominal pain and diarrhea which is the most commonly reported symptom.

Methods: Clinic for Infectious and Tropical Diseases was included in Prospective Controlled Multinational GI-COVID-19 Study. The study which was performed in 36 centers in 12 countries enrolled 1961 patients. The aim of the study was the assessment of the prevalence of GI symptoms in hospitalized patients with COVID-19, the identification of risk factors for the development of COVID-19-related GI symptoms and the persistence of GI symptoms 1 month after the initial assessment.

Results: GI symptoms occurred more frequently in patients with COVID-19 than in the control group (59.7% vs. 43.2%). Patients with COVID-19, as compared with the control group, reported higher rates of nausea, diarrhea, loose stool and urgency and lower rates of constipation and hard stools.

Persistence of symptoms at a 1-month follow-up was found in less than 17% of cases and the prevalence of nausea and acid regurgitation remained higher in the COVID-19 cohort of patients than in noninfected patients.

Conclusions: The finding that COVID-19 is associated with GI symptoms in a high proportion of infected patients and the persistence of some of these symptoms, may increase awareness of the role of GI involvement in COVID-19

Key words: Covid 19, gastrointestinal symptoms, diarrhea

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Evaluation of The Effects of the SARS CoV-2 Pandemic on The Molecular Diagnostics For Cancer Patients And High-Risk Individuals at the Institute for Oncology and Radiology of Serbia

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Background: The SARS-CoV-2 pandemic introduced a global distraction effect in all aspects of cancer patients' care. After the first feeling of disbelief and panic that we all experienced, we tried to organize ourselves the best we could and to continue working in the new emergency situation in order to ensure timely issuance of results of molecular diagnostic methods at the Institute.

Methods: EGFR, KRAS/NRAS, BRAF and BRCA1/2 mutation testing of advanced lung adenocarcinoma, metastatic colorectal, metastatic melanoma and ovarian cancer patients were performed by qPCR and NGS. NGS was also used for panel testing of hereditary breast/ovarian cancer and cancers associated with Lynch syndrome.

Results: During the state of emergency, a 38% reduction in the total number of requested analyses for targeted molecular testing was detected compared to the previous two-month period in part because a lower number of patients was managed through our tumor boards. Additional complications were related to the procurement of chemicals and equipment. During the state of emergency for the genetic counseling, 95% of the scheduled appointments were canceled. We used this situation to increase the number of laboratory analyzes for patients who had already entered the procedure and were waiting for the result. In this way, we significantly reduced waiting lists and increased the number of analyzes by 50%. We conducted post-test genetic counseling and genetic consultations by phone or online and 30% of patients were rescheduled because they wanted live consultations.

Conclusion: With a good reorganization, we have increased the number of analyzes and reduced the waiting time for the result. The SARS-CoV-2 pandemic effect will further be evaluated through a long-term analysis of both the survival and quality of life of our cancer patients. The only positive effect of the pandemic included shortening of the waiting lists for genetic testing of hereditary cancer patients and high-risk individuals.

Key words: State of emergency, reduced influx of patients, increased number of analyzes.

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COVID-19 associated pulmonary aspergillosis: single center experience

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Background: Coronavirus disease 19 (COVID-19) associated pulmonary aspergillosis (CAPA) represents an important complication in patients with COVID-19. CAPA is increasingly being reported in COVID-19 disease because of systemic corticosteroid use, severe lung damage, comorbidities and extensive use of broad-spectrum antibiotics.

Methods: Retrospective analysis of 120 patients with microbiologically and serologically proven invasive pulmonary infection (IPI) in Covid hospital Batajnica from 1st September 2021 to 24th December 2021 was performed.

Results: Among 120 pts, 78 (65.5%) were male. The mean patients' age was 65 years. Positive microbiological findings from sputum samples or bronchoalveolar fluid were obtained in 17 (14.3%) patients, while positive serological tests and blood cultures were found in 103 (85.7%) patients. Invasive mechanical ventilation was performed in 41 (34.5%) patients, non-invasive ventilation including high flow oxygen therapy in 79 (65.5%) patients. The most frequent comorbidities were diabetes mellitus in 34 (28.6%) patients, hematological malignancies in 21 (17.6%), chronic obstructive pulmonary disease (COPD) in 16 (13.4%) patients. Antifungals were applied in all patients. Echinocandins were administered in 42 (35.3%) patients, voriconazole in 30 (25.2%) and fluconazole in 27 (22.7%) patients. Lethal outcome was recorded in 79 (63.9%) patients.

Conclusion: CAPA occurring as a complication of severe COVID-19 pneumonia is associated with increased mortality. Prompt recognition and treatment may lead to a favourable outcome.

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Health care of neurological disorders in patients with COVID-19

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Background: Neurological disorders occur in approximately half of hospitalized patients with SARS-CoV-2 infection. For certain neurological complications, it remains unknown whether they are a direct consequence of COVID-19 or are part of the clinical picture of a critically ill patient. A rare but very significant complication of COVID-19 is Guillain-Barre syndrome (GBS). The objective was to investigate the frequency of previous COVID-19 and vaccination against SARS-CoV-2 in patients with GBS, as well as to define health care procedures in these patients.

Methods: The data from the medical history of patients hospitalized under the diagnosis of GBS at the Clinic of Neurology UCCS in the period from 06 Mar 2020 to 01 Jan 2022 were used for the analysis. The results were compared with available studies dealing with neurological disorders in patients with COVID-19.

Results: In the observed period, 44 patients were diagnosed with GBS. Of the total number of observed patients, 27.2% had a previous infection caused by SARS-CoV-2 virus, and 13.6% had a disease development preceded by vaccination against SARS-CoV-2 virus. In the health care procedures individual approach to the patient was used, which includes the assessment of GBS severity, the presence of previous comorbidities, the type of therapy applied and potential complications of treatment.

Conclusion: A significant percentage of patients with GBS have COVID-19 or SARS-CoV-2 vaccination as a potential trigger. Further research is needed to confirm this hypothesis.

Keywords: Guillain-Barre syndrome, COVID-19, SARS-CoV-2, health care

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Surgical Treatment of Unstable Femoral Trochanteric Fracture in Elderly Patients with Bilateral Pneumonia and SARS CoV-2 Infection

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Background: Surgical treatment of unstable femoral trochanteric fracture (UFTF) in elderly patients with bilateral pneumonia and SARS-CoV-2 infection is difficult, uncertain and with unpredictable outcome due to prolonged preoperative care, delayed surgical intervention and complex rehabilitation. Aim of the study is to present our experience of surgical treatment of unstable femoral trochanteric fracture in elderly patients with bilateral pneumonia and SARS-CoV-2 infection.

Methods: Retrospective analysis included 15 elderly patients with UFTF, SARS-CoV-2 infection complicated with bilateral pneumonia (BP) in the period between September 10, 2021 and February 10, 2022. PCR real time test SARS-CoV-2 was applied ambulatory in screening centers. We utilized AO classification of trochanter fracture of femur. Surgical method: closed reposition of fracture and internal fixation (CRIF). Anesthesia: regional (spinal) or endotracheal anesthesia. Covid pneumonia was confirmed by MSCT (Philips Brilliance 64 CT scanner).

Results: Among 15 patients, 12 (80%) patients were female. Patients' ages were between 65 and 92 years. In AO classification dominant fractures were 31A2-3 in 9 (60%) of patients. 14 patients had ASA score III and one patient had ASA score II. Surgery: CRIF with short or long Intertrochanteric Nail. There were two postoperative negative/death outcomes. Rehabilitation was introduced in all patients on the first postoperative day.

Conclusion: It is essential to undertake surgical treatment in elderly patients with UFTF and SARS-CoV-2 infection complicated with BP as soon as medical conditions are met and patients are able to tolerate spinal or endotracheal anesthesia.

Key words: surgical treatment, unstable trochanteric fracture of femur, elderly patients, bilateral pneumonia, SARS-CoV-2 infections.

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Health Care of Children with SARS CoV-2 Infection

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Background: Respiratory viruses such as influenza and respiratory syncytial virus (RSV) remain the leading causes of ARI in children under five years of age. However, although the acute respiratory syndrome - coronavirus - 2 continues to grow, young children appear to be less susceptible. Since the beginning of the pandemic in March 2020, we have hospitalized a total of 141 Covid positive patients. Of that number, 16 required mechanical ventilation.

Method: Search of the Pubmed database, as well as insight into the medical documentation of patients and protocols of the University Children's Clinic.

Results: Since the beginning of the pandemic in March 2020, we have hospitalized a total of 141 Covid positive patients at the University Children's Clinic. Of that number, 16 required mechanical ventilation.

Conclusion: The care needs of children with SARS CoV-2 infection depend not only on the condition of the child caused by SARS-CoV 2 infection, but also on the conditions caused by his underlying disease. Therefore, the needs for care are complex, starting with those related to the maintenance of airway patency, the application of prescribing therapy, as well as health care in the application of all other diagnostic and therapeutic procedures. A special challenge for nurses were children on mechanical ventilation, newborns, as well as children with hemato oncological diagnosis who had SARS-CoV 2 infection.

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CytoSorb® Therapy in critically ill Covid-19 patients: Rationale and current clinical experience

Matthias Thielmann¹ and Daniel Wendt²

Background: The COVID-19 pandemic is a global health problem. Knowledge of the virus and its infectivity, as well as treatment methods have made rapid progress over the last 2 years. Despite global vaccination strategies, there are still limited options to effectively treat critically ill patients. So far, steroids, monoclonals or various anti-inflammatory drugs have been evaluated. CytoSorb® is an adjunctive method in COVID-19 therapy to remove cytokines, which are known to cause endothelial damage and several other complications in COVID-19 pathophysiology during the COVID-19 induced cytokine storm. CytoSorb® can be easily incorporated into various extracorporeal perfusion platforms, such as CRRT, ECMO or hemoperfusion systems.

Methods: The present evaluation aims to present a holistic overview of the current knowledge on hemoadsorption therapy using CytoSorb® in critically ill patients suffering from COVID-19. We searched for relevant articles in Medline and abstracted clinical information based on pre-defined criteria (COVID-19, hemoadsorption and ECMO). Moreover, data of the FDA Emergency Use Authorization (EUA) CytoSorb® Therapy in COVID-19 (CTC) registry (Requiring Extracorporeal Membrane Oxygenation: A Multicenter, Retrospective Registry) is reported (NCT04391920).

Results: A total of 7.000 patients suffering from COVID-19 were treated in over 30 countries by adjunctive hemoadsorption via various extracorporeal perfusion platforms. More than 30 scientific articles reflect the current knowledge in this specific COVID-19 cohort. In patients presenting with acute respiratory distress syndrome (ARDS) in combination with acute kidney injury requiring continuous renal replacement therapy (CRRT), a reduction of inflammatory mediators, stabilized hemodynamics, improved respiratory function and a reduction in SOFA scores could be observed. Mortality rates compare favorably to series of CRRT-treated COVID-19 patients. In regard to COVID-19 patients on ECMO therapy with ARDS, treated within the CTC registry (52 patients, 5 US centers), mortality rates compare favorably

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to international benchmarks of ECMO COVID-19 patients: ICU mortality was 17.3% (9/52) on day 30, 26.9% (14/52) on day 90, and 30.8% (16/52) at final follow-up of 153 days. The final analysis of the so far 100 treated patients is pending. In this registry, survivors had a trend toward lower baseline D-Dimer levels (2.3 ± 2.5 vs. 19.8 ± 32.2 $\mu\text{g/mL}$, $p=0.056$) compared to non-survivors. Logistic regression analysis suggested a borderline association between baseline D-Dimer levels and mortality with a 32% increase in the risk of death per 1 $\mu\text{g/mL}$ increase ($p=0.055$). CytoSorb® was well-tolerated without any device-related adverse events reported.

Conclusions: Meanwhile, several medical societies globally have recommended CytoSorb® as an adjunctive therapy especially in critically ill COVID-19 patients. However, proper patient selection, therapy goals, timing and dosing are crucial for the success of the CytoSorb® treatment. So far, CytoSorb® therapy for critically ill COVID-19 patients on ECMO was associated with high survival rates suggesting potential therapeutic benefit and US multicenter data (CTC) have shown a higher 90-day survival rate compared to ELSO registry cohort. Elevated baseline D-Dimer levels may suggest increased risk of mortality. Nevertheless, prospective controlled studies are warranted to substantiate these results.

COVID-19 and Obesity

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Background: Obesity has been recognized as a major risk factor for COVID-19-related prognosis.

Methods: Aim of study was to evaluate severity of disease in obese and non-obese patients in context of two predictive models, COVID-19 Severity Index (SI) and the National Early Warning Score 2 (NEWS2) and to identify comorbidity linked to greater disease severity and in-hospital mortality from COVID-19 in obese patients. This retrospective study evaluated 230 patients (124 males, 66.65±1.191years, 106 females, 70.20±1.394years) admitted to the semi-intensive care unit of COVID-19 hospital "Batajnica", University Clinical Center of Serbia, between September and November 2021. Results have been presented via percentages and mean±SE with crosstabs, t-test and MW-test being employed.

Results: 39% of our patients were obese (Body Mass Index ≥ 30kg/m²), out of which 48.90% were females and 67.77% were older than 65 years. Obese patients had significantly higher COVID-19 SI and NEWS2 compared to non-obese (10.3333±0.5018 vs. 8.3643±0.3721, p<0.01; 4.4222±0.3128 vs. 3.4643±0.2211, p<0.05, respectively), but the mortality rate of the groups did not reach statistically significant difference (33.3% vs 22.9%, respectively). Also, obese and non-obese did not differ in context of number of hospital days or COVID-19 duration. Obese patients had more comorbidities (specifically hypertension and diabetes), more COVID-19 related complications compared to non-obese, but statistically significant difference has not been reached.

Conclusions: Further investigations are recommended for better understanding of the contributing factors to COVID-19 disease severity and complications in the context of obesity, in order to identify preventive strategies and to develop new therapeutic interventions in this high-risk group.

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Mouth - the first line of defense against SARS CoV-2 infection

Lidija Kruškonja¹

Coronavirus is a virus from the group of respiratory viruses that is transmitted by droplets. Droplets spread through the air when we cough, sneeze and talk. Covid 19 virus is found in the saliva of the mouth, nose and throat. Saliva contains IGA immunoglobulins, which are important in neutralizing the virus. Immunoglobulin A is an antibody that plays an important role in the immune function of the mucosa. Therefore, saliva plays a significant role in the body's defense against the Covid 19 virus. There is evidence of transmission through objects or materials contaminated with live virus such as cutlery, stethoscopes, thermometers that have been in contact with an infected person. Transmission can occur when you touch objects and then your mouth, nose and eyes. The oral cavity is the first contact with the virus and therefore should be the first line of defense. How to protect yourself?

Recommendation and prevention of Covid 19 virus disease:

A new global study (published in the British Medical Journal) has shown that the mask reduces the incidence of Covid 19 by 53%.

Use a clean mask and change regularly.

Regular and more frequent changes of oral hygiene accessories - toothbrushes should not be stored in plastic caps to close them because they cannot dry out, and a humid environment is very conducive to the development of viruses, fungi and bacteria. After brushing your teeth, the brush should be rinsed under a stream of warm water and left upright to dry. Also, family members should not keep toothbrushes together in a common cup to avoid contamination..

Stay hydrated to prevent dry mouth.

Rinsing the mouth with antiseptic solutions has shown importance during times of high virus transmission and when we all spend a lot of time with masks.

Proper diet.

Correcting bad habits in children and adolescents (nail biting).

Oral health is part of general health and with proper maintenance and adequate protection we preserve and prevent the development of both viral and other diseases of the body.

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Outcome of CKD in COVID-19

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Background: Since the outbreak of COVID 19 there have been 351 million confirmed cases and 5.6 million deaths worldwide, while in Serbia we have had 1.54 million cases of COVID 19 and 13271 deaths with an approximate death rate of 0.85%. Influence of chronic kidney disease and chronic dialysis on the outcome of patients with the coronavirus infection is still not clear.

Methods: This study included 88 patients with COVID-19 who were hospitalized at the Nephrology department in Zvezdara University Hospital from 01.04.2020. to 01.06.2020. Thirtyseven (42%) of them had CKD, while 51 (58%) had no kidney problems. We compared outcomes between CKD and non CKD group and analyzed dialysis as a risk factor for adverse outcomes.

Results: Patients mean age was 62±15 years and 59,1% were male. Out of 88 patients, 37 had CKD. At the end of treatment, 46 patients (52,3%) were discharged home, 27 (30,7%) were transferred to another hospital and 14 (15,9%) died. It was shown that patients with CKD had 3-fold higher chances for discharge than for the fatal outcome ($p=0.05$) and 4-fold less risk for use of the mechanical ventilation (ns) as compared to non CKD patients. We also found that ESRD and chronic dialysis affect outcomes with statistical significance ($p=0.01$) in a way that it doubles the risk for the adverse outcome.

Conclusion: Patients with CKD, especially those with ESRD had significantly higher risk for the lethal outcome and higher chances to require mechanical ventilation.

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How a Hololens2 Device Helps Doctors in COVID-19 Intensive Care Unit

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Background: COVID-19 pandemic exerted pressure on human and material resources throughout the world which led to increased risk of substandard patient care. The solution might be found in digital technology, which can help doctors to scale their work. One such device is Microsoft HoloLens 2, an artificial intelligence-driven platform, which generates computer images on real-world surfaces, thus providing stereoscopic visualization.

Method: We investigate if the use of the Hololens2 device could reduce the anaesthesiologists' exposure to SARS-CoV-2 by observing time spent in the red zone. Groups are compared using linear mixed models and paired samples t-test. All p values less than 0.05 were considered significant. A secondary goal has been to assess the usability and acceptability of this new technology.

Results: The measure of the anaesthesiologists' exposure to the SARS-CoV-2 was taken to be the average time per doctor per shift spent in the intensive care unit. The average time spent in regular mode is 364±71 (95% CI 353-375) minutes, while in HoloLens2 mode, average time spent in ICU is 288±59 (95% 276-299) minutes. Significant difference of 76 (95% CI 59-93) minutes in average (21% average decrease) is obtained between the modes ($p<0.001$). Overall user satisfaction is 85.7%.

Conclusion: The Hololens 2 device has the potential to resolve some challenges imposed by the COVID-19 pandemic on the traditional treatment methods. The results of our study are optimistic, but they require an additional, more comprehensive, and stricter evaluation.

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In-Hospital Outcome of Patients With COVID-19 and Acute Coronary Syndrome Treated with Percutaneous Coronary Intervention: a Single Center Experience

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Background: COVID 19 is systemic disease which may be associated with high cardiovascular risk. We sought to investigate in-hospital outcome of patients with active COVID 19 infection and acute coronary syndrome (ACS) who underwent primary or urgent percutaneous coronary intervention (PCI).

Methods: Retrospective analyses included 38 consecutive patients hospitalized in Clinical Hospital Center Zemun due to acute coronary syndrome (ACS) and confirmed or highly suspected COVID 19 during 2020 and 2021 pandemic.

Results: Mean patient age was 64.6 years, 27 (71%) were male. STEMI was diagnosed in 21/38 (55%), NSTEMI in 14/38 (37%) and unstable angina in 3/38 (8%) cases. Mean period from symptom onset to the onset of ACS was 6.8 days. Mean ejection fraction measured by echocardiography was 39.6%. Primary PCI was performed in 21/38 (55%), while urgent PCI in 17/38 (45%) patients. In STEMI patients, mean total ischemic time was 337 minutes and mean door-to-wire time was 52 minutes. TIMI 3 flow was achieved in 31/38 cases (82%) and 34/38 (90%) procedures were considered as angiographically successful. 4/38 (10.5%) patients were presented with cardiogenic shock. 16/38 patients (42%) required mechanical ventilation. There were no vascular or complications and stent thrombosis. Mean duration of hospitalization was 7.1 days. Overall in-hospital mortality was 29% (11/38 patients).

Conclusions: It appears that PCI in ACS during active COVID 19 is associated with high in-hospital mortality despite good in-hospital logistics and high rate of angiographically successful interventions.

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Retroperitoneal hematoma in COVID-19 patients required emergency surgery – COVID hospital Batajnica experience

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Since microvascular thrombosis is common in COVID-19 disease, low-molecular weight heparin (LMWH) in therapeutic dose is a part of the clinical management of hospitalized COVID-19 patients. Anticoagulation treatment may cause life-threatening bleeding complications such as retroperitoneal hematoma. As spontaneous retroperitoneal hematoma is a serious condition with the absence of symptoms, creating a challenge for diagnosis, it should also be considered in COVID-19 patients which are thought to be predisposed to thromboembolism.

Material and methods: The study was conducted in COVID Hospital Batajnica, University Clinical Center of Serbia, from March 2021 to March 2022, on patients with a severe form of COVID-19, required emergency surgery due to retroperitoneal hematoma. All the patients were treated on LMWH more than 1mg/day. Diagnosis of retroperitoneal hematoma was confirmed with MDCT.

Results: during one year 32 (0,16%) of all hospitalized patients required emergency surgery due to uncontrolled bleeding from retroperitoneal hematoma. Among them 47% were female and 53% were male. Average age was $71,15 \pm 28$ years. All patients (100%) had one or more comorbidities. Overall mortality was 0,13%.

Conclusion: The use of anticoagulants in severe forms of COVID 19 is not without risks. The effect of anticoagulant therapy, especially in patients with existing risk factors, early diagnosis, and prompt therapy of spontaneous retroperitoneal hematomas is imperative to reduce mortality from this severe complication, in patients with the COVID-19.

Age, male gender, severe or critical COVID-19 disease, and treatment dose of LMWH may be risk factors for retroperitoneal hematomas.

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COVID-19-Related Acute Kidney Injury in Critically Ill Patients Treated With Continuous Renal Replacement Therapy

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Background: Patients with a difficult clinical COVID-19 have a higher risk of developing AKI. The goal of the study is to determine characteristics of critically ill COVID-19 patients with AKI, treated with CRRT.

Methods: From March 2020 to July of 2021 the study covered 101 patients at the Clinical Center of Vojvodina. Demographic, clinical and biochemical parameters were analyzed before and after CRRT treatment and CRRT parameters.

Results: The average age was 64.69 years, 82.2% male patients, 75.2% suffering from hypertension. 93.7% were on IMV and 92.1% were on vasoactive therapy. The average length of IMV until the beginning of CRRT was 4.65±4.57 days. In the first 24 hours after starting IMV, 60% of patients developed AKI/AKI on CKD. Before CRRT, with the average value of SAPS II score 39.13±14.45; creatinine 312 µmol (IQR 208-437.5), procalcitonin 2.70ng/l (IQR 0.2-7.20), while 10.9% of patients had the SpO₂/FiO₂ index (>200) and 41.6% had anuria. The average CRRT procedure number was 2.01±1.36, the most common modality was CVVHDF in 67.3% of patients and 46% used Oxiris membrane. Using binary logistic regression, including demographic parameters, comorbidities and clinical parameters before CRRT, showed that patients with history of previous renal disease had 3.36 higher chance and patients with the SpO₂/FiO₂ index (>200) had a 64% lower chance of developing AKI/AKI on CKD the first 24 hours of after starting IMV.

Conclusions: Early triage of patients with a comorbid CKD and risk of AKI and timely recognition of indications for CRRT improves the treatment of critically ill patients with COVID-19.

Key words: COVID-19, continuous renal replacement therapy, acute kidney injury, critically ill patients

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Percutaneous Dilatation Tracheostomy For Critically Ill With COVID-19 – Single Covid Center Experience

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Background: In COVID-19 disease, 14% of patients have severe disease and 5% are critically ill. Some of these patients require urgent endotracheal intubation and mechanical ventilation due to respiratory failure. In patients with long term endotracheal intubation and mechanical ventilation, bedside percutaneous dilatational tracheostomy (PDT) may be considered.

Methods: Adult patients with severe COVID-19 disease admitted into the Intensive Care Unit (ICU) of the University Clinical Center of Vojvodina who were on mechanical ventilation for 5 days or longer were evaluated for PDT. All medical staff that performed the procedure had appropriate personal protective equipment. Before the procedure, the oral cavity toilet and pre-oxygenation with 100% oxygen was performed. Patient was positioned in a supine position with a roll under the shoulder. Hypnotic, opioid analgesic and muscle relaxant were given. PDT was conducted under direct control of the fiberoptic bronchoscope: blunt dissection of the pretracheal tissues and introduction of a tracheal cannula in the patient's trachea using a guide by Seldinger technique was done. At the end of the procedure, evaluation of the tracheal cannula position was made and chest X-ray was done. The number of patients with PDT, mean time from intubation to performing PDT and complications were recorded.

Results: From September 1st 2021 - February 28th 2022, 88 patients with COVID-19 underwent PDT. The mean time from intubation to the PDT was 7±2 days. The most common complications were: tracheostomy related bleeding (2 patients) and pneumothorax (5 patients).

Conclusion: PDT is a simple, safe and effective procedure performed in COVID-19 patients in the ICU.

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Patient Selection and Course of Action For ECMO Procedure in COVID-19 – Covid Hospital, University Clinical Center of Vojvodina Experience

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Background: Extracorporeal membrane oxygenation (ECMO) is a lifesaving procedure especially important in patients with COVID 19. The ability of starting new ECMO programs in large volume admissions is not rational. Therefore, it is very important to identify patients who could benefit from this form of support, for achieving adequate cooperation with the remote ECMO team. The aim of our paper was to highlight the most important aspects for the use of the ECMO in patients with COVID 19 in remote settings.

Methods: We retrospectively analyzed characteristics of patients who fail with conventional treatment and qualified for ECMO as a lifesaving procedure from September 2021. through February 2022. We also analyzed the course of actions in assessment of patients who are considered for ECMO.

Results: At the time observed, 20 patients were supported by the ECMO team, 12 of them were transferred from regional hospitals. For 16 patients, first contact with the ECMO team was made before the patient was intubated. Second contact was made after the intubation and starting mechanical ventilation. Definitive decision was made after analysis of parameters of arterial blood gasses analysis and ventilator settings. Vasoactive support was needed in 5 patients in the process of initiation of cannulation, and 2 patients needed cardiocerebropulmonal reanimation during a process of cannulation.

Conclusion: Strategy in patients selection and management consists of adequate preemptive consideration of potentially highly risky patients for conventional treatment failure. Best possible timing, preparation and collaboration with an experienced ECMO team can improve overall survival.

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The Role of Cardiopulmonary Exercise Testing In Post-COVID-19 Patient

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Background: Holistic assessment and management is advisable in post-COVID-19 patients. Here, we present a case of a 39-year-old male with prolonged dyspnea after mild SARS-CoV2 infection, but without obvious cardiopulmonary disorder.

Case Report: Two-months after a mild form of acute COVID-19 disease, our patient referred to our Clinic complaining about recurrent breathlessness during physical exertion, fatigue, deep sighing, light headache, and musculature tightness. Physical examination, vital signs, and initial laboratory were normal. The chest X-ray and the 12-lead electrocardiogram were remarkable. He was diagnosed with dyspnea and prescribed Theophylline. Further examination involved: transthoracic echocardiography, endocrinological and neurological examination, fiberoptic laryngoscopy, multi-detector computed tomography of endocranium, spirometry testing, lung diffusion capacity for carbon monoxide, lung ultrasound, high resolution computed tomography, computed tomography pulmo-angiography. All findings were in physiological range. Differential diagnosis included anxiety-related dysfunctional breathing. However, psychiatric evaluation revealed only mild anxiety and severe insomnia, which were unlikely the main reason for present symptomatology. Finally, cardiopulmonary exercise test (CPET) was performed pointing on: reduced exercise capacity (VO_2 peak 28 ml/kg/min), acceptable lactic threshold (VAT) (63% from value of peak VO_2), impaired ventilatory efficiency (VE/VCO_2 slope 32.4), increased VE peak value (100 L/min) in the presence of preserved breathing reserve (42%). Ventilatory equivalents reached slightly increased values. After CPET, the most probable cause of dyspnea in our patient was diastolic dysfunction.

Conclusion: The CPET may be a useful diagnostic tool in post-COVID-19 patients, while additional investigations should bring more extensive conclusions concerning SARS-CoV-2 and heart failure with preserved ejection fraction.

Note: The results of this abstract were included in the manuscript entitled "Cardiopulmonary Exercise Test in the Detection of Unexplained Post-COVID-19 Dyspnea", published in International Heart Journal in September 2021.

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Bronchoscopy in COVID-19 Patients: Why, When and How

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Background: The role of bronchoscopy in COVID-19 is a matter of debate. Many hospitals have decided to cancel all elective procedures and, in some cases, closed down entire endoscopy units. While some bronchoscopy procedures are indeed elective, bronchoscopy is discouraged and should not be a first-line testing modality for patients with suspected COVID-19

Methods: The systematic review of the MEDLINE literature (via PubMed) analyzed the experiences in the organization of bronchoscopy, as well as protocols, standard operating procedures and recommendations for bronchoscopy in COVID 19 patients

Results: Among patients with clinical suspicion of COVID-19 with negative nasopharyngeal swab specimen results by real-time PCR with reverse transcription (RT-PCR), bronchoscopy could provide increased sensitivity by obtaining samples from the lower respiratory tract. In patients with severe COVID-19, mainly admitted to the intensive care unit (ICU), bronchoscopy may be required to manage complications such as atelectasis or haemoptysis, to solve issues with mechanical ventilation, and to rule out superinfection. Bronchoscopy in COVID-19 is not without risks, including disease transmission to healthcare staff. However, there can be situations where bronchoscopy can be a life-saving procedure. Hence, for this purpose, indications for bronchoscopy in this COVID pandemic can be divided into three categories: urgent bronchoscopy, semi-elective bronchoscopy and elective bronchoscopy. Procedure bronchoscopy has significant aerosolization potential, and some centers developed an innovative closed bronchoscopy system designed to reduce aerosolization during bronchoscopy.

Conclusions: Bronchoscopy is pivotal as part of the armamentarium against COVID-19, and should be used for the confirmation of SARS-CoV-2 infection, as well as in the management of complications in COVID- 19 patients

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Surgical and Orthopedic Patient's Admission and Treatment in a Semi-Intensive Care Unit(SICU)

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Summary: A patient is admitted to a hospital when an outpatient treatment (previously treated outside the hospital) hasn't had satisfactory results, when a patient's state requires intensive diagnostic and therapeutic procedures, as well as health care or in case of emergency medicine.

Goal: This summary states the contents and gives a description of the procedures, upon admitting patient's to a semi-intensive care unit in order to meet the specified quality requirements.

Patients usually have high expectations from both medical staff, in sense of intra-personal relations, as well as medical service. Admission to a hospital (can be) is a complex and sensitive situation (through) in which a nurse initiates and builds a relationship between medical staff and a patient.

This relationship is bound to continue in the semi-intensive care unit. The way in which a patient and their attendants are welcomed and admitted to a hospital can, at first, affect their reactions and feelings, as well as their attitude and cooperation during the whole process of treatment and care. Therefore, it is always stressed that the first contact can be the most important. The key to success lies in the comprehensive evaluation, establishing (defining) priorities, cooperation and communication.

Key words: Admission, patient, nurse, care.

Influence Of SARS-CoV-2 Vaccines On Survival Among Maintenance Dialysis Patients With COVID-19

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Background: Since the pandemic has started, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) caused more than 15 thousand deaths in Serbia. Several types of vaccines are developed to prevent further morbidity and mortality. Patients on maintenance hemodialysis are highly susceptible to SARS-CoV-2 infection. This study evaluated the influence of vaccines on survival among hemodialysis patients.

Methods: This prospective cohort study included all patients on maintenance dialysis who were treated in Covid hospital Batajnica from December 2020 through October 2021. Patients are divided in two groups depending on vaccinal status. Some clinical and laboratory parameters were also studied as potential risk factors for lethal outcome.

Results: This study enrolled 205 dialysis patients of mean age 63 ± 13.1 years, among them 132 (63.8%) were male. Vaccine has received 98 (47.8%) patients. There were no differences between groups according to comorbidities and vascular complications during hospitalization. No differences were observed in deaths rate among patients receiving the vaccine versus unvaccinated patients (43.9 vs. 46.7%, $p=0.682$, respectively). Also, there was no difference in inflammatory parameters between these two groups. Independent predictors of in-hospital mortality were age (HR 1.021, CI 1.003-1.040) and D-dimer on admission (HR 1.075, CI 1.002-1.154).

Conclusions: Sars-CoV2 vaccines did not improve survival among maintenance dialysis patients. Age and severe inflammatory response due to COVID-19 were independent risk factors for fatal outcome.

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Treatment of Patients with Cushing's Syndrome and COVID-19

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Background: Patients with Cushing's syndrome (CS) represent a highly sensitive group during coronavirus disease 2019 (COVID-19) pandemic. This is due to a specific constellation of morbidities, some of which even individually present risk factors for severe cases of COVID-19. Aside from the effect of obesity, diabetes mellitus and hypertension, another relevant feature is a profound immune suppression in patients with CS. It is still debatable if this might be protective against acute respiratory distress syndrome (ARDS), but it imposes a risk for prolonged duration of viral infection and superinfections leading to sepsis. In addition, proper treatment of COVID-19 in patients with CS is undefined and challenging. Exogenous glucocorticoids enhance immune system alterations, adrenolytic therapy increases a risk for even more deleterious adrenal insufficiency, and interactions with current antiviral drugs are unknown.

Case series: We have treated 3 female patients with CS. Two of them were treated with standard of care, both progressed to ARDS and died in the intensive care unit. The third patient was treated with intravenous immunoglobulins (IVIg) that enabled quick onset of immunomodulatory effect. The patient's condition quickly stabilized with no direct side effects of a given treatment, and she was soon discharged from the hospital.

Conclusion: Treatment of COVID-19 in patients with CS has many obstacles, but so far there are no guidelines for treatment of COVID-19 in patients with active CS. It is our opinion that immunomodulating therapies like IVIg might be an effective and safe treatment modality in this particularly fragile group of patients.

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SARS-CoV-2 Infection in Kidney Transplant Recipients

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Background: Kidney transplant recipients under immunosuppressive therapy are at increased risk for COVID-19 as well as the poor outcome.

Methods: The retrospective study included kidney transplant recipients treated in The Clinic of Nephrology, University Clinical Center of Serbia. All the patients were on triple immunosuppressive therapy which included CNI, MMF (MPA)/mTOR inhibitors/Azathioprine and corticosteroids. Data were collected from patients' medical history for the period between 1 April 2020 and 1 March 2022.

Results: Of the 238 kidney transplant recipients, 74 had COVID-19. Three patients had the infection twice, so 77 episodes of the infection were recorded. Half of them had severe forms of disease and required hospital admission. Mortality was 15%. There were neither graft losses in the cured patients nor significant deterioration of graft function. Immunosuppression was modified in all the patients. MMF/mTOR/Azathioprine was stopped, steroids doses increased, CNI doses, regarding severity of disease, decreased. Hospitalized patients, if it was needed, received monoclonal antibodies or antiviral drugs depending on the period of disease.

Conclusions: Kidney transplant recipients with Covid-19 in 50% had a severe clinical presentation of disease and required hospitalization. Covid-19 didn't cause graft loss or graft function deterioration in less severe forms of disease.

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Severe COVID-19, Delta Versus Omicron, is there any Difference?

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Background: COVID-19 was first known in the city of Wuhan, China. For almost 2 years working, we believe that we have some experience in treatment of COVID-19. But every new strain of coronavirus, from alpha to delta and lately omicron, brings us new challenges in treating patients with COVID19. Despite COVID19's significant morbidity and mortality, considering long term consequences on health of COVID19 in hospitalized patients, we are trying to find or to discover risk factors for poor outcome of illness.

Method: Prospectively, in a regular surveillance of hospitalized patients in the department for infectious disease, from 1st December 2021 until 31st January 2022, we include 298 patients in study to discover risk factors for acquisition of severe COVID19. Patients were divided in two groups, patients hospitalized in December 2021, with dominant Delta strine, versus, January 2022, and dominant Omicron strine. All data were taken from patients' medical records.

Results: In the first group 68.4% of hospitalized patients had respiratory oxygen saturation less than 93%, versus 58.2% in the second group. Admitting in ICU 13.20% versus 12.55%. Vaccine status (2 doses) 39.5% versus 57.6%. Time from revaccination until hospitalization was 257.88+63.95 days versus 304.20+47.93. Death rate was 7.9% versus 9.2%. Death in group of vaccinated was 3.7% versus 3.3%

Conclusion: There is a difference between strain od Delta and Omicron. Delta strain caused respiratory insufficiency more than Omicron, consequently higher risk for admittance in ICU. Higher percentage of vaccinated patients was hospitalized in the period when omicron strain was predominant.

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Risk Factors for Intensive Care Unit Admission, Mechanical Ventilation And Mortality In Patients With COVID-19

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Background: Coronavirus disease 2019 (COVID-19), the pandemic infection caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), presents with an extremely heterogeneous spectrum of symptoms and signs. Most infected people will develop mild to moderate illness and recover without hospitalization. The most common reason for hospitalization of these patients is respiratory insufficiency.

Methods: A targeted review of literature reporting risk factors for Intensive Care Unit admission, mechanical ventilation and death. Authors analyzed data from the literature and compared them with data obtained from patients in our series. We retrospectively collected data on 2093 patients hospitalized for Covid19 diseases. The variables which were considered were gender, age, associated comorbidities, obesity, smoking status, nutrition status, level of serum albumin, levels of IL-6, CRP, absolute lymphocyte count, neutrophils and neutrophil-to-lymphocyte ratio.

Results: Male gender, 80 year old and above and mechanical ventilation have been identified as the most common risk factors for death. Factors influencing the higher incidence of hospitalization are heart failure, diabetes, chronic kidney disease, dementia, age > 45 years, male gender, obesity. Malnutrition and lower albumin level at admission were significantly associated with a higher risk of transfer to ICU and mechanical ventilation.

Conclusion: The data from our series do not differ much from the data from the available literature including high mortality in mechanically ventilated patients and patients with thromboembolic complications and patients requiring renal replacement therapy.

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Cardiovascular Disease and Macrovascular Complications of Diabetes During COVID-19

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Background: Cardiovascular complications in COVID-19 have a diverse clinical presentation including silent myocardial injury, acute coronary syndromes, thromboembolism, cardiac arrhythmias, and heart failure. Underlying diseases such as diabetes and hypertension increases the risk of COVID-19 severity and mortality.

Methods: Literature review of microvascular complications of diabetes during COVID-19.

Results: SARS-CoV2 can directly affect cardiac tissue or inflammatory response during diabetic condition and worsen the underlying heart conditions. Through cytokine storm SARS-CoV-2 leads to elevated levels of pro-inflammatory cytokines creating an imbalance in the functioning of T helper cells affecting multiple organs. Inflammation and Th1/Th2 cell imbalance along with Th17 have been associated with DM, which can exacerbate SARS-CoV2 infection severity. Binding to ACE-2 receptors SARS-CoV2 then leads to its depletion which promotes the activation of Renin-angiotensin system (RAS) pathway. This induces inflammation promoting insulin resistance that has positive effect on RAS pathway, causes β -cell dysfunction, promotes inflammation and increases the risk of cardiovascular complications.

Hypercoagulation in COVID-19 is thought to occur due to the profound inflammatory response and cytokine storm. Because patients with diabetes have a more pronounced inflammatory response, they may be at greater risk to suffer from thromboembolic events in the case of COVID-19. Another important contributor in patients with diabetes may be hyperglycemia, which was previously shown to further exaggerate coagulation, as well as hyperinsulinemia, which inhibits fibrinolytic activity.

Conclusions: Cardiovascular complications associated with diabetes contribute to COVID-19 severity and mortality, so these factors should be acknowledged when assessing the risk of a more severe course of COVID-19 in these patients and therefore manage their treatment totally.

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Collection of the Anti-COVID-19 Plasma at the Blood Transfusion Institute of Serbia

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Due to the lack of specific therapy and a high speed of virus transmission during the Covid 19 pandemic, collection of convalescent plasma was initiated so that specific antibodies, formed to virus antigens, could be used via transfusion in the treatment of hospitalized patients.

Plasma collected from recovered patients was obtained by plasmapheresis, a safe method routinely performed in specialized blood transfusion establishments. Based on the decision made by the Covid-19 Infectious Disease Crisis Staff, Blood Transfusion Institute of Serbia (BTIS) was appointed as the coordinator of the project Collection and Issuing of the anti Covid-19 Plasma Program. BTIS made necessary adjustments of its infrastructure and started collection of convalescent plasma among the first similar establishments in Europe. Precise criteria were formed for the collection, use and monitoring of the administered plasma effects.

The first case of SARS-Cov 2 virus infection in Serbia was registered on March 6th, 2020, and the first unit of convalescent plasma from a recovered donor was collected on April 11th, 2020,.

Use of convalescent plasma started on April 14th, 2020, when the unit of anti-Covid-19 plasma was issued for the treatment of a patient at the Infectious Diseases Clinic of the Clinical Center of Serbia.

Objective of this report is to present experiences of the BTIS staff related with collection and preparation of the convalescent plasma for the Covid-19 patients in pandemic conditions.

Collection and Issuing of the anti Covid-19 Plasma Program for the use in hospitalized patients in Serbia started shortly after the occurrence of the new disease COVID-19. In that way, due to the lack of specific therapy, timely treatment was enabled for patients in all clinical centers in our country.

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SARS-CoV-2 Associated Acute Kidney Injury

Aleksandra Kezic^{1,2}

Although pneumonia with respiratory failure is the main manifestation of SARS-COV2 infection, kidney involvement is also common and predicts a high mortality rate that, by some reports, reaches values greater than 70%. Mechanisms that have been implicated in the high AKI occurrence rate in patients with SARS-Cov2 pneumonia are predominantly of inflammatory origin, but can also include ischemic thrombotic injury. Besides systemic inflammatory response and consequent multi-organ function failure, there is a growing number of reports indicating direct viral invasion of the renal proximal tubular cells and podocytes. Despite first comprehension of SARS-COV2 infection as a cytokine storm syndrome, clinical studies have shown lower levels of circulating proinflammatory cytokines in patients with SARS-COV2 pneumonia than in patients with acute respiratory distress syndrome with different etiology. It has been observed an impaired type I interferon response, which predispose patients to develop Th17 immune response instead of Th1 immune response. The spectrum of renal pathology in severe SARS-COV-2 infection included macrophage and CD3+CD4+ T cell kidney infiltration causing glomerular and peritubular capillaritis, endothelial and tubular injury with ultrastructural evidence of mitochondrial damage, which all together indicate similarities with kidney involvement in sepsis. In addition to endothelial injury development of microvascular thrombi could participate with systemic haemodynamic instability in development of acute kidney injury.

Novel data regarding pathophysiological mechanisms of SARS-COV-2 infection and associated AKI may allow the development of novel diagnostic and therapeutic targets in the treatment of these critically ill patients, aiming to reduce high mortality rate.

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Clinical and Laboratory Parameters that Affect the Treatment Outcome of Patients with Acute Kidney Injury and SARS-CoV-2 Infection

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Background. AKI is emerging as an important sequel of SARS-COV-2 infection in hospitalized patients contributing to higher mortality. The goal of this study is to describe the risk factors for AKI during SARS-COV-2 infection and the association with mortality.

Methods. We conducted a retrospective study among patients (aged ≥ 18 years) who were hospitalized with confirmed SARS-COV2 infection in Covid hospital Batajnica in Serbia, between December 4, 2020, and April 30, 2020. The Cox proportional-hazards model was used to determine factors associated with the five-year survival rate.

Results. Among 7282 hospitalized patients a total of 288 (3,95%) patients were identified as AKI. Of these, 82 (28.47%) were treated with hemodialysis. There were 203 patients (70,5%) older than 70 years who had AKI. Mortality of patients with AKI was 79.5%. Patients who survived had at admission lower serum values of CRP (126.21 ± 212.14 vs. 201.96 ± 407.31 mg/L; $P=0.014$) and ferritin ($3.232.65 \pm 10211.78$ vs. 5738.93 ± 18.388 ng/mL; $P=0.004$). On multivariate analysis besides serum ferritin and CRP values, the number of days from hospitalization to the onset of AKI remained the independent predictors of survival. The presence of diabetes mellitus and cardiovascular comorbidity including hypertension were not predictors of survival.

Conclusion. AKI in hospitalized patients with SSARS-COV-2 infection was associated with significant risk for death which is mainly related to the degree of inflammation.

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Pulmonary Test Changes During Post-Covid Recovery: Is It a Reversible Disease?

Marija Laban Lazović¹

Introduction: In almost half of patients treated for severe COVID pneumonias, there was no absolute correlation between pulmonary function disorders and CT scans, and disorders kept persisting after complete radiographic regression. Dominant manifestation was reduced lung diffusion capacity for CO (TLCoc, KCoc), while spirometry values were mostly normal.

Methods: Research included 200 patients treated for severe COVID pneumonia at the semi-intensive care unit 4 in "Batajnica" COVID hospital of the University Clinical Centre of Serbia from December 2020 to June 2021. Patients were followed up for six months after discharge.

Results: At all follow up visits, 30, 90 and 180 days after discharge, their most frequent complaint was fatigue on low exertions. Mean values of TLCoc and KCoc were 42 and 50% 30 days after discharge, 67 and 69% 90 days after discharge, and 89 and 99% 180 days after discharge. Lowest values of both TLCoc and KCoc at first follow ups were 21%. In 75% of patients who suffered ARDS, the earliest verified values of diffusion parameters were below 30%. 22% of patients had restrictive ventilatory disorder. The lowest registered FVC value at the third follow-up visit was 56%. In 85% of patients diffusion parameters returned to normal after 6 months.

Conclusion: At our post-COVID follow ups, not a single CT scan showed definite lung fibrosis, or progression of interstitial changes, while pulmonary function parameters returned to normal within six months, which implies that COVID-19 is a reversible disease.

Key words: post COVID 19 syndrome, pulmonary function parameters, lung fibrosis

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Prognostic Parameters of In-Hospital Mortality in Patients With COVID-19 – Single Center Experience

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Background: The most common indications for the hospital treatment of patients with COVID-19 were hypoxia, CRP value, severity of pneumonia and age. We analyzed potential predictors of mortality in hospitalized patients with Delta variant COVID-19, who were mostly older than 65 years, and unvaccinated.

Methods: We performed an analysis of 134 consecutive patients with confirmed Delta variant COVID-19 admitted to the semi-intensive care unit four in Covid Hospital Batajnica, between September 15 and October 25, 2021. Demographic data, medical history, laboratory values, and CT severity score were analyzed to identify predictors of mortality. Univariate and multivariate logistic regression models were used to assess potential predictors of mortality in hospitalized COVID-19 patients.

Results: The mean patient age was 60.1 years (range, 24-93 years), predominantly men, 61.9%. Comorbidities were present in 55.6% patients with hypertension (32.8%) as the most frequent found. Almost all patients (94.8%) needed oxygen support, 12.7% patients were on invasive mechanical ventilation, 17.9% on noninvasive, and 20.9% on high flow oxygen therapy machines. The median CT score was 14. 38.8% of patients experienced complications during hospital stay. The median time of hospitalization was 15.5 days (25th to 75th percentile: 11-21). The mortality rate was 15.7%. Older age, presence of comorbidities, invasive mechanical ventilation, severity of pneumonia and CRP to albumin ratio (CRP/Alb) were significant predictors of mortality.

Conclusion: Study identified several potential predictors of mortality in hospitalized COVID-19 patients. The CRP/Alb ratio may be a promising prognostic biomarker for risk stratification and clinical management of patients with COVID-19.

Key words: COVID-19, severity, predictors of mortality

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COVID-19 Pneumonia Complicated By SIADH

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Background: Hyponatremia is often associated with atypical pneumonia. In the case of COVID19, hyponatremia can be multifactorial and one of the causes is the syndrome of inappropriate antidiuretic hormone secretion (SIADH).

Case: We present the case of a 59-year-old woman with worsening pneumonia, temporospatial disorientation and newly developed hyponatremia.

She was hospitalized due to severe bilateral interstitial pneumonia and acute respiratory insufficiency. Infection with SARS CoV2 was confirmed. Initial therapy led to clinical, biochemical and radiographic improvement, but after a month of treatment atypical pneumonia worsened followed by confusion and temporospatial disorientation. Hypoosmolar hyponatremia was confirmed. She was clinically euvolemic, without elements of heart, kidney, hepatic, adrenal or thyroid insufficiency. SIADH was suspected and treatment with hypertonic saline administration and fluid restriction was started as well as revision of pneumonia therapy.

The treatment led to good clinical and biological progress with gradual increase in serum sodium concentration, inflammation markers started to normalize followed by radiographic resolution.

Conclusion: It is important to establish the exact etiology of hyponatremia in patients with COVID-19 because therapeutic management differs depending on its pathophysiological mechanism.

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Intracranial Hemorrhage in COVID-19 Patients, Radiologic View, COVID-19 Register of „St Sava“ Hospital

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Background: Intracranial hemorrhage (ICH) is a well documented complication of COVID-19. Previous studies indicate that the most likely underlying mechanisms are: neurotropism of virus, disseminated coagulation, endothelial dysfunction, prolonged hypoxia, hyperinflammatory syndrome and downregulation of the angiotensin-converting enzyme 2. The aim of investigation is to explore ICH in Covid-19 patients.

Methods: We retrospectively analyzed 505 patients with neurological manifestations of Covid -19 infection, hospitalized in "St Sava" Hospital in Belgrade from 16 March 2020 to 31 December 2021. Collected data included demographic variables, potential risk factors, laboratory values, clinical status and imaging parameters. Patients with parenchymal, subarachnoid, subdural hemorrhage and hemorrhage secondary to cerebral venous thrombosis were enrolled in study, while those with microhemorrhage were not.

Results: We identified a total of 76 (15%) patients with ICH consisting of 41 males (53.9%) and 35 females (46.1%). Mean age was 72, 8. The most common variety was intraparenchymal hemorrhage in 48 (63.1%) patients. Hemorrhage involving multiple cranial compartments was discovered in 13(17%) patients. Subarachnoid hemorrhage had 8 (10.5%) patients. Cerebral venous thrombosis was noticed in 5 (6.6%) patients. The least common, 2 patients had subdural hematoma (2.6%). In the subgroup of intraparenchymal hemorrhage of 48 patients, 29 patients (60.5%) were presented with lobar ICH. Almost a quarter of all patients (22.3%) were on previous oral anticoagulation therapy. The mortality rate was 40.7%.

Conclusions: ICH associated with COVID-19 have some specific characteristics such as lobar location and multifocality, certain rate of anticoagulation therapy as causing factor and high rate mortality.

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Limb Arterial Thrombosis in Hospitalised Patients With COVID-19 - Our Experiences

Bogdan Crnokrak¹

Background: A higher incidence of arterial thrombosis in the limbs was observed in patients hospitalised due to pneumonia caused by COVID-19 than in patients receiving hospital treatment before the COVID-19 pandemic.

Methods: Hospitalised patients treated for pneumonia caused by COVID-19 with a clinical presentation of critical limb ischemia were examined between June 2020 and February 2022 in the Clinical Hospital Centre "Bežanijska kosa". The epidemiological data, laboratory analyses, severity of clinical presentation of COVID-19, previous atherosclerosis of extremity arteries, treatment and treatment outcomes of these patients have been analysed.

Results: Among 7880 patients treated in the Clinical Hospital Centre "Bežanijska kosa", 20 (0.25%) developed critical limb ischemia. The patients were predominantly male, with average age 64 years, moderate and severe clinical presentation of COVID-19 pneumonia at the moment of developing ischemia (mean CT severity score 16), without changes in the arteries affected by thrombosis in terms of existing atherosclerosis. The mortality rate was 50% regardless of the treatment.

Conclusions: COVID-19 can be considered an independent factor in the development of arterial thrombosis of extremity arteries in patients with severe disease form.

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Upper Endoscopy in Patients with COVID-19

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Background: Coronavirus disease 2019 (COVID-19) is predominantly presented by respiratory symptoms, but gastrointestinal symptoms are also common. The incidence of gastrointestinal bleeding in hospitalized patients with COVID-19 is 2-13%. The main reason for bleeding may be the use of drugs and comorbidities. The role of the infection itself in the onset of bleeding is unknown.

Methods: The cross-sectional study included patients with COVID-19, who underwent upper endoscopy in Covid Hospital "Batajnica". Data were collected on the basis of medical documentation. Basic sociodemographic, clinical and endoscopic data were collected. Descriptive statistics methods were used.

Results: Upper endoscopy was performed in 26 patients. The mean age of the patients was 68.2±13.2 years and 65.4%(n= 17) were men. The most common indication for endoscopy is gastrointestinal bleeding. Melena is present in 59.1%(n= 13), melena and hematemesis in 18.2%(n= 17), and rectorrhagia in 9.1% (n= 2) patients.

The most common pathological endoscopic finding is ulcer, which has 30.4%(n= 7) patients. Gastric ulcer has 17.4%(n= 4), duodenal ulcer 13.0%(n= 3), and esophageal ulcer has 4.3%(n= 1) patients. The second most common pathological finding is gastritis, in 26.1%(n= 6) patients. Gastric tumor and duodenal stenosis are present in 8.7%(n= 2) patients. Other findings were present in 17.4%(n= 4) patients. Endoscopic hemostasis was performed in 13.6%(n= 3) patients.

Conclusion: The most common indication for upper endoscopy in patients with COVID-19 is melena. Although the cause of bleeding is often detected, endoscopic hemostasis is rarely required.

Acknowledgment/note: Upper endoscopies in Covid Hospital "Batajnica" were performed by: Popovic D, Sokic-Milutinovic A, Milovanovic T, Stojkovic S, Dragasevic S, Cvejic-Pasic T, Rankovic I, Milivojevic V, Stulic M, Glisic T, Lukic S and Mijac D.

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Skin and SARS-CoV-2 - what did we learn during the Pandemic?

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Background: On 11 March 2020, the WHO declared the novel coronavirus disease (COVID-19) a global pandemic, caused by the severe acute respiratory syndrome coronavirus-2 (SARS CoV-2), and it has had enormous health, economic, and social consequences. Although the lung is the most frequently affected organ, the skin has also resulted in being a target of COVID-19 disease.

Methods: Literature review of available evidence

Results: The first description of patients with cutaneous manifestations associated with SARS-CoV-2 was reported by Recalcati. Skin lesions related to SARS-CoV-2 classified according to their morphology presented as: vesicular eruption, petechial/purpuric rashes, acral lesions, livedoid lesions, urticaria and maculopapular rashes. Sometimes skin lesions may be the first presenting symptoms of SARS-CoV-2 infection including acral lesions, vesicular eruptions, and urticaria. The pathophysiological mechanisms of skin lesions dividing into two categories: (I)-those manifestations that are mainly based on the direct viral cytopathic effect on cells of the organism, including in this group maculopapular, urticaria and vesicular eruptions; (II) -those manifestations due to T lymphocytes, and macrophages, such as secondary infection with uncontrolled overexpression of cytokines (cytokine storm).

Conclusions: In some patients, the diagnosis of skin lesions could help in taking measures to prevent infection in patients with minor or asymptomatic symptoms.

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Acute Myocardial Infarction in Patients with COVID-19: The experience of COVID-dedicated hospital "Bežanijska kosa"

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Background: Various pathophysiological mechanisms within COVID-19 are responsible for an increased risk of acute coronary syndrome and its complications. Acute myocardial infarction in the setting of concomitant COVID-19 is a serious condition and can significantly affect further treatment and prognosis.

Methods: Retrospective analysis of COVID-19 patients with acute myocardial infarction treated in University Clinical Hospital Center Bežanijska kosa was performed. Patients over 18 years of age, presenting with signs of acute myocardial infarction and confirmed COVID-19 with positive real-time polymerase chain reaction (RT-PCR) test were enrolled. Acute myocardial infarction was defined in accordance with the Fourth Universal Definition of Acute Myocardial Infarction. Data were collected and analyzed regarding risk factors, comorbidities, clinical findings at admission, length of hospitalization, major complications, echocardiographic findings, and mortality.

Results: A total of 22 patients were included, 16 patients were male (72,7%), while 6 patients were female (27.3%). Mean patient age was 66.7 years. Fifteen patients (68%) were admitted with STEMI and 8 patients (32%) with NSTEMI. Twelve patients had diabetes mellitus, while 3 patients had a history of previous coronary artery disease. The average time from symptom onset to the first medical contact was 298 minutes. Nine patients had an estimated ejection fraction of less than 35%. Five patients presented with cardiogenic shock. Seven patients needed invasive mechanical ventilation. The overall mortality was 36.8%.

Conclusion: COVID-19 and concomitant acute myocardial infarction is linked to presenting features and poor outcomes. Urgent strategies are needed to improve the outcomes of these patients.

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Impact of COVID-19 Pandemic on Surgical Treatment Outcomes in Patients With Primary And Metastatic Liver Tumors – an Experience of The HPB Unit at the University Clinic for Digestive Surgery

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Background: The COVID-19 pandemic has challenged public health, mainly the provision of various health care services to patients with malignant disease. The pandemic has influenced the diagnosis and treatment of primary and metastatic liver cancers resulting in impairment of surgical and oncologic outcomes. The aim of this study was to evaluate the impact of the COVID-19 on the outcomes of surgical treatment of primary and metastatic liver tumors performed at the HPB unit of the academic surgical hospital.

Methods: This retrospective study included 64 HCC patients and 145 patients with colorectal cancer liver metastasis (LM) who underwent liver resection at the HPB Unit of the Clinic for Digestive Surgery, University Clinical center of Serbia. The patients were divided into two groups: patients treated from March 2020 to February 2021 (n = 26 (HCC), 65 (LM), study group) and patients treated from March 2019 to February 2020 (n = 38 (HCC), 80 (LM) control group). The short-term outcomes (overall survival) were compared between the groups

Results: The two groups had comparable overall survival ($p > 0.05$), however the study group patients had significantly longer waiting time for scheduled surgery compared to patients in the control group ($p < 0.05$). Ten patients in the study group were not treated due to disease progression (8 patients) or due to death (2 patients). None of the scheduled patients for liver resection in the control group stayed without the planned treatment.

Conclusions: The COVID-19 pandemic caused delayed surgical treatment in patients with primary and metastatic liver tumors and some patients were not operated due to disease progression

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Impact of COVID-19 Pandemic on the Outcomes of Transarterial Chemoembolization in Patients With Hepatocellular Carcinoma.

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Background: In the recent past coronavirus disease (COVID-19) challenged the health care services worldwide. It has disrupted various interventions and among them, the ability to perform transarterial chemoembolization (TACE) for patients with hepatocellular carcinoma (HCC). The aim of this study was to evaluate the impact of the COVID-19 on the outcomes of TACE in HCC patients.

Methods: This retrospective study included 66 HCC patients who underwent TACE treatment at the Clinic for Digestive Surgery, University Clinical center of Serbia. The patients were divided into two groups: patients treated from March 2020 to February 2021 (n = 27, study group) and patients treated from March 2019 to February 2020 (n = 39, control group). The short-term outcomes (overall survival) were compared between the groups.

Results: The two groups had comparable overall survival ($p > 0.05$), however the study group patients had significantly longer waiting time for TACE procedure compared to patients in the control group ($p < 0.05$). Six patients in the study group were not treated due to disease progression (4 patients) or due to death (2 patients). None of the listed patients for TACE in the control group stayed without the planned treatment.

Conclusions: The COVID-19 pandemic caused delayed TACE treatment in HCC patients who were listed for this intervention.

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Methylprednisolone Treatment in Patients With Severe COVID-19 Pneumonia: Are Pulse Doses The Right Choice?

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Background: Numerous risk factors affect the survival of patients with severe COVID-19 pneumonia. Corticosteroids are most commonly applied in patients with severe COVID-19 pneumonia. We aimed to evaluate the efficacy of methylprednisolone pulse doses in these patients, as well as to determine the predictors of the fatal outcome.

Methods: In this pilot study, we examined the predictors of the fatal outcome in 683 patients with severe COVID-19 pneumonia, hospitalized in the COVID Hospital Batajnica from August 15th to December 20th 2021. Logistic regression was used to analyze the relationship between treatment and potential predictors.

Results: In our study group, there were 410 males (60%) and 273 females (40%), with the mean age of 60.3 years (22-83 range). Comorbidities (diabetes mellitus, hypertension, chronic heart disease, chronic kidney disease, chronic obstructive pulmonary disease,..) existed in 478 patients (70%). Methylprednisolone pulse doses (500 mg) were administered to 352 patients (51.5%). Classic (2mg/kg) dose methylprednisolone were administered to 331 patients (48.5%). Complications (pneumothorax, pneumomediastinum, bleeding...) were recorded in 358 patients (52.4%). In the multivariate logistic regression model, statistically significant predictors of fatal outcome were: classic (2 mg/kg) dose methylprednisolone versus pulse dose methylprednisolone ($p = 0.042$; OR 1.88), advanced age ($p < 0.001$; OR = 1.08), existence of complications ($p < 0.001$; OR = 111.48) and positive hemoculture ($p < 0.001$; OR = 6.47).

Conclusions: Our data suggest that the use of pulse dose methylprednisolone reduces the chance of a fatal outcome by almost 50%, when controlling for other factors in the model. However, the most significant predictor of death were complications. With all the limitations, further research is needed for confirmation of our results.

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Factors Associated with the Adjustment of Psychotropic Therapy in Hospitalized Patients with Psychosis and COVID-19

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Background: Treatment of COVID-19 in psychotic patients is a challenge in terms of choice of psychotropic drugs, individual adjustment of the dosage regimen, according to mental and somatic conditions, the occurrence of complications in treatment, as well as the interaction between drugs. The aim of this study was to examine the association of various factors with the adjustment of psychotropic therapy in hospitalized patients with psychosis and COVID-19.

Methods: This case-control study included 116 COVID-19 positive psychotic patients, admitted and treated at the COVID department of the Clinic for Mental Disorders "Dr Laza Lazarević" in the period from December 2020 to December 2021. All subjects were divided into two groups based on whether psychotropic therapy was adjusted during treatment. From the data, the following variables were compared and analyzed: severity of infection, age, gender, comorbidities, mental state at hospital admission, existence of renal insufficiency and biochemical liver lesions, types of administered psychotropic drugs as well as usage of antibiotics, favipiravir and immunomodulatory drugs.

Results: In 62 (53.4%) patients psychotropic therapy was adjusted, and in 54 (46.6%) patients there was no change in psychotropic therapy. There were no statistically significant differences between the observed groups in terms of gender, age and mental state at hospital admission. In the severe clinical form of COVID-19, changes in psychotropic therapy occurred significantly more often.

Conclusions: COVID-19 positive psychotic patients require special care during the infection regarding the choice and dosage of psychotropic drugs, especially in severe clinical form of the disease.

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The Importance and Role of The Vaccination Point in The Clinic for Mental Disorders “Dr Laza Lazarević”

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Background: The COVID-19 pandemic is a serious challenge for people with mental disorders as well as for healthcare facilities where they are treated. For this reason, it is important to develop strategies that can help reduce the risk of COVID-19 disease in psychiatric patients such as organization of vaccination points. The aim of this study was to show the importance of organization of such services, since they have a very important role in the immunization of these patients.

Methods: The vaccination point in Clinic for Mental Disorders “Dr Laza Lazarević” was opened in January 2021 and for a period of one year, 344 people were immunized. Data about vaccinated persons, for the purpose of the study, were obtained from the patients’ medical records.

Results: 248 (72%) of 344 immunized were patients of the Clinic. The mean value of respondents from the group of patients with mental disorders was 42.21 ± 4.62 years. In terms of gender, 116 or 46.77% were women, and 132 and 53.23% were men. 139 (56.05%) of patients were immunized with two doses of Sinopharm SARS-CoV-2 vaccine (vero cell) inactivated; 80 (32.26%) of patients with two doses of AstraZeneca (ChAdOx1-S recombinant vaccine) and 29 (11.69%) of patients with Pfizer BioNTech COVID-19 Vaccine.

Conclusions: Organization of vaccination points in psychiatric facilities is very important, because they are easily accessible and patients have confidence in the healthcare workers of the institution where they are treated.

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Delirium as a Complication of the Treatment of COVID-19 Positive Patients in Psychiatric Intensive Care Units

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Background: Recent studies show that delirium is a common complication in COVID-19 patients in hospital settings, and the occurrence is higher than expected for similar infections. The aim of this study was to identify risk factors for delirium in COVID-19 positive patients treated in psychiatric intensive care units.

Methods: This study was conducted as a case-control study and enrolled 40 COVID-19 positive psychiatric patients treated in the COVID department of the Clinic for Mental Disorders "Dr Laza Lazarević" who were divided into two groups. The study group comprised 20 COVID-19 positive psychiatric patients with a diagnosis of delirium. The control group also comprised 20 COVID-19 positive psychiatric patients without delirium, who were consecutively recruited from the pool of patients from the COVID department of the Clinic. Groups were matched by gender and age. Medical data were obtained from the patient's medical records.

Results: In terms of psychiatric diagnosis, there was no statistical significance between observed groups. The study group of patients was significantly more likely to suffer from diabetes mellitus and addiction diseases than the control group of patients. Also, the study group patients had statistically significant higher values of laboratory parameters (C-reactive protein and D-dimer) than the patients from the control group.

Conclusions: Comorbidities and the severity of the COVID-19 clinical forms are likely to be risk factors for developing delirium in patients treated at the psychiatric intensive care units.

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Analysis of the outcome of surgical treatment of patients with obstructive jaundice operated on during the covid pandemic-our experiences

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Background: Causes of obstructive jaundice are numerous and can be roughly divided in benign, malignant, depending on the cause of obstructive jaundice. It is necessary to use adequate diagnostic and therapeutic methods in a timely manner, in order to avoid the occurrence of complications, which can sometimes be fatal.

Methods: We present the results of a retrospective cohort study that included two groups of patients. The main group included 20 patients who underwent surgical treatment due to obstructive jaundice during the covid pandemic (Mar. 2020 - Mar. 2022). The control group included 35 patients who also underwent surgical treatment for the same reason, during the time period before the covid pandemic occurred (Jan. 2017 - Jan. 2019).

Results: We obtained by comparing the parameters that were monitored in this study will be presented in more detail in our presentation.

Conclusions: diagnostic and therapeutic methods we have used are limited to a small number of medical centers in our country. In the hope that the previously mentioned monitored parameters will prove to be useful in the further development of research and treatment of the said entity, both globally and locally.

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Nutrition of critically ill patients with COVID-19

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Among people infected with the COVID 19 virus, 5 to 32% are admitted to the ICU. It varies from country to country. Of the number received, 15 to 100% required invasive mechanical ventilation, 47 to 63% required some form of non-invasive mechanical ventilation, 4% required ECMO, and 44.9% required inotropes. Mostly these were elderly patients, with significant comorbidities (hypertension, diabetes, cardiac diseases, liver disease, asthma, obesity,...). In these critically ill patients who were in the ICU, the Sequential Organ Failure Assessment (SOFA) score ranged from 4.73 ± 1.88 to 7.78 ± 2.58 . There were 15 patients per 1,000,000 inhabitants with COVID 19 infections in the ICU in Serbia in March 2022. All of them required nutritional therapy.

These patients had all the characteristics of critically ill patients, such as protein catabolism, synthesis of inflammatory proteins, poor glycemic control. Critically ill guides have been used in these patients. Oral and enteral intake (EN) are preferred as a mode of nutritional support. However, oral intake is a problem because one of the main symptoms was loss of appetite and taste, and it is often necessary to use a nasogastric tube or post pyloric diet. In case that the nutritional goal could not be reached in this way, parenteral nutrition was introduced into the therapy. Nutritional support should be introduced gradually, to be adjusted to the comorbidity and condition of the patient.

Nutritional therapy is a necessary part of the therapy of critically ill patients with COVID 19 infection. This reduces the side effects of a strong inflammatory response.

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Is There a Difference in the Outcome of Thrombolysis with Intravenous Tissue-Type Plasminogen Activator in Stroke Patients with and Without COVID-19?

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Background: Stroke in patients with COVID-19 is attracting increasing attention during the global COVID-19 pandemic, perhaps due to substantial disability and mortality that can result from both conditions. Still, there is little information regarding the outcome of thrombolysis with intravenous tissue-type plasminogen activator (IV-tPA) in stroke patients with COVID-19.

Method: We report demographics, clinical characteristics, and the outcome of 14 patients with COVID-19 and acute ischemic stroke who were treated with IV-tPA in our hospital in the period November 2020–March 2022.

Results: There were 14 patients in our case series. The mean age was 66 years (range, 54–77 years). Ten patients were men and 4 were women. Most of them had moderate to severe strokes (NIHSS range 3–18). Two of them had a fatal outcome (mRS 6) and 2 patients had poor functional outcome (mRS 5). Patients with poor functional outcomes or fatalities did not have a clinical picture of severe COVID-19.

Conclusion: Given the small sample size, it is not clear whether the stroke patients with COVID-19 have a worse or similar outcome of IV-tPA compared to patients with acute stroke without COVID-19.

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Sexual Dimorphism in Patients with COVID-19

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Background: The biggest 21st century pandemic has shown a different morbidity and mortality in males vs females and in elderly vs young patients. The aim was to compare gender differences according to age and severity of COVID-19.

Methods: This retrospective study evaluated 304 patients (162 males, 66.85 ± 13.03 years and 142 females, 71.3 ± 13.09 years) admitted to the semi-intensive care unit of COVID-19 hospital "Batajnica", University Clinical Center of Serbia. To stratify the severity of COVID-19 we used the National Early Warning Score 2 (NEWS2) and COVID-19 Severity Index (SI). To compare genders according to age patients were stratified in 3 groups: ≤ 60 , $61 - 64$, ≥ 65 . The primary outcome was critical COVID-19 illness defined as death. Accuracy of the scores were evaluated with the area under the receiver-operating characteristics curve according to gender.

Results: Females were significantly older than males ($p = 0.000$). There was no difference in gender distribution according to the NEWS2 and COVID-19 SI categories. There was no difference in mortality rates between sexes. In the group ≤ 60 , there were more males than females whereas in older groups there was no difference in the number of males vs females. The NEWS2 score cut-off value was the same for both genders, 4.5, whereas COVID-19 SI cut-off value for males was 7.5 and for females 8.5.

Conclusions: Both gender and age are significant determinants of COVID-19 outcome. NEWS2 and COVID-19 SI are reliable tools in predicting a severe COVID-19 outcome, however COVID-19 SI is gender specific.

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Clinical Characteristics and Outcomes of Urgent Surgery in Patients with COVID-19: a Single-Center Experience

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Background: Coronavirus disease 2019 (COVID-19) pandemic has an unprecedented impact on surgical services worldwide. Numerous studies have demonstrated increased perioperative morbidity and mortality in patients with ongoing SARS-CoV-2 infection. Indications for an urgent surgery can also be the consequence of COVID-19, such as thromboembolic complications or bleeding. The outcome is affected by the intensity of hyper inflammation, various and complex disorders of hemostasis, corticosteroid therapy, age and comorbidities, and the degree of respiratory failure. Our study aimed to explore the characteristics of patients, perioperative outcomes, and risk factors for mortality after urgent surgery in patients with COVID-19.

Methods: The retrospective study analyzed all patients operated in Covid Hospital Batajnica from March 2021 to March 2022. Patients admitted after an operation in another institution were excluded.

Results: During the study period 262 urgent surgeries were performed in 203 patients, of whom 147 (72.4%) were male. The median age was 72 [66-79] years, with the range of 17-100 years. At least one comorbidity was present in 167 (82.3%) patients. The majority of patients (181; 89.2%) required supplemental oxygen on the day of surgery, while 35 (17.2%) patients were on invasive mechanical ventilation for treatment of COVID-19. The most frequent type of surgery was abdominal (201; 76.7%), followed by orthopedic (38; 14.5%), neurosurgical (10; 3.8%), vascular (7; 2.7%), ENT (3; 1.1%), and urological (3; 1.1%). Spontaneous soft tissue hematoma was the indication for surgery in 42 (20.7%) patients, with a median time of 16 [13-24] days after admission to the hospital. General anesthesia was used in 258 (98.5%) operations. The overall 30-day mortality was 51.2% (104/203).

Conclusions: A high mortality in our series can be attributed to the advanced patients' age, multiple comorbidities, and the fact that the majority of them underwent surgery with severe COVID-19 disease requiring respiratory support. An experience from previous pandemic surges can help in improving postoperative outcomes with the critical attitude towards anticoagulant therapy, and institution of interventional radiology procedures in patients with spontaneous soft tissue hematomas.

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Pathohistological Findings of Kidney Biopsies in Patients Following SARS COV-2 Infection

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Background: COVID-19 may directly affect kidney functions, but the full impact remains unclear. COVID-19 has been associated with acute kidney injury, that's probably due to acute tubular injury but, this however does not explain proteinuria and haematuria that're often observed.

Methods: In this study, kidney biopsies of 11 patients, from a tertiary centre, who experienced symptoms of renal impairment following COVID-19 were analysed.

Results: The mean age of the examined patients was 51.66 ± 18.56 . Urinalysis indicated they had hematuria and proteinuria. Mean value of proteinuria was $5.4 \pm 6.3 \text{g/24h}$, serum creatinine was $475 \pm 307.1 \text{mg/dL}$. Average time from COVID-19 to onset of symptoms ranged from a few days to ten months. Five patients had a prior medical history of hypertension, Sjogren's syndrome, hypothyroidism, Systemic lupus erythematosus, and prostate cancer. Antineutrophil cytoplasmic antibody (ANCA)-associated vasculitis (with rapidly progressive glomerulonephritis) (4/11) and focal segmental glomerulosclerosis (2/11) were the most common form of glomerular disease. Two patients had Immunoglobulin A nephropathy/vasculitis. In two cases patients had severe diffuse acute tubular injury, together with dilatation of peritubular capillaries with thrombosis. Kidney biopsy of one patient with proteinuria (22g/24h) and serum creatinine 55mg/dL showed amyloidosis. In case of systemic lupus erythematosus, the changes probably intensified following COVID-19.

Conclusion: Kidney dysfunction is one of the complications of COVID-19. Pathohistology findings from this study support the notion that more data from future kidney biopsies are of utmost importance to elucidate the pathology of kidney injury and glomerular involvement associated with SARS CoV-2 infections.

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Type 2 Diabetes And Chronic Kidney Disease: COVID-19 Outcomes

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Background: COVID 19 infection is associated with higher risk of poor outcome among patients with type 2 diabetes (T2D). Previously unsatisfactory glycemic control and chronic kidney disease (CKD) were recognized as risk factors of poor outcome. The objective of our study was to examine the effect of glycemia at hospital admission on clinical outcomes among patients with T2D and CKD.

Methods: We performed retrospective analysis of medical records including 80 patients with T2D and CKD hospitalized in Covid hospital "Batajnica". According to glycemia at admission, patients were divided: group A (n=27) had glycemia ≤ 7.2 mmol/l whereas B (n=53) had glycemia > 7.2 mmol/l. Demographic characteristics, biochemical parameters as well as clinical outcomes were analyzed among groups using appropriate statistics.

Results: Groups were comparable in respect to age (group A 73.5 ± 8.8 vs. B 74.9 ± 9.5 years, $p=0.54$) and gender (male group A 51.9% vs. 50.9%, $p=0.93$). However, previous insulin treatment was recorded in a significantly higher number of patients in group A (34%) than B (11%) ($p=0.02$). Although, difference was not observed regarding creatinine (group A 135.6 ± 11.4 mmol/l vs. B 163.9 ± 12.9 mmol/l, $p=0.16$), group A had significantly higher eGFR (group A 44.0 ± 2.7 ml/min vs. B 36.6 ± 1.9 ml/min, $p=0.03$). Also, group A had shorter hospital duration (8.1 ± 0.8) than B (10.1 ± 0.7 days, $p=0.05$). Moreover, survival rate was better in group A (74.1%) than B (52.8%) ($p=0.05$).

Conclusion: Better metabolic control at admission was associated with shorter hospital duration and lower mortality rate in COVID19, which implies the importance of prior glycemic control among patients with T2D and CKD.

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Perioperative Complications Following SARS-CoV-2 Infection in Digestive Surgery-Single Center Experience

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Background: In the Covid-19 era, there is an increasing number of patients who have recovered from SARS-CoV-2, many of whom also require elective surgery. There is insufficient data about the postoperative complications following elective digestive surgery after COVID-19. Aim of the study was determining whether patients recovered from Covid-19 are at increased risk of postoperative complications.

Methods: We retrospectively analyzed postoperative complications after elective digestive surgery with patients who recovered from SARS-CoV-2 (post-covid group) during the year 2021 and compared with control group - patients who have not been infected with SARS-CoV-2 who also underwent elective digestive surgery in four months period of 2021. A logistic regression was performed to ascertain Covid-19 severity on postoperative complications.

Results: 167 patients met study criteria (85 patients from post-covid group and 82 patients from control group). Patients from post-covid group developed higher number of postoperative complications – pneumonia (10.6% vs 1.2%, $p=0.018$), bleeding (24.7% vs 6.1%, $p=0.001$), arrhythmias (15.3% vs. 2.4%, $p=0.02$) and major postoperative morbidity on day 30 (45.9% vs. 24.4%; $p=0.006$). In 78% patients time after covid recovery to operation was prolonged more than 8 weeks, 2% between 4 and 8, and 20% patients less than 4 weeks. From mild symptoms suffered 41% of patients, moderate 34% and from severe/critical symptoms 25%. Severe cases of Covid-19 disease were associated with an increased number of postoperative complications.

Conclusion: Patients who recovered from COVID-19 developed a higher number of postoperative complications indicating the possibility that Covid-19 severity and timing of elective surgery in this group of patients are crucial.

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Impact of Comorbidities on the Length and Course Hospitalisation in Patients with COVID-19

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Background: During the pandemic caused by the new SARS-CoV-2 virus, hundreds of millions of people worldwide became ill. Patients with cardiovascular (CV) risk factors such as arterial hypertension, obesity, and pre-existing cardiovascular (CV) disease have been shown to be more susceptible to COVID-19 and more likely to have severe form of disease. The aim of the study was to present the distribution of CV risk factors in patients with COVID-19 and the association of COVID-19 with the most common CV diseases in patients hospitalised in the temporary Covid hospital in Serbian Institute of occupational health “Dr Dragomir Karajovic”.

Methods: The retrospective study included a total of 207 patients who were hospitalised in the temporary hospital of the Institute of Occupational Medicine of Serbia in the period from September 13, 2021. until October 31, 2021.

Results: Out of 207 patients, 124 were male and 83 female. The average age was 60. The results indicate that the most common comorbidities in the examined patients with COVID-19 were the following CV diseases: arterial hypertension (in 52.17% of hospitalised patients), obesity (in 31.88%), diabetes (in 19.81%), coronary heart disease (12.08), cardiac arrhythmias (8.69). Out of the total number of examined patients, 68.6% had an associated disease, while 57.5% of patients had a previous CV disease.

Statistical analysis confirmed that comorbidities did not have a significant effect on the length of hospitalisation.

Conclusion: Patients with CV risk factors and existing CV diseases are a risk group of patients with COVID-19. COVID-19 disease is a systemic disease with primarily respiratory symptoms, which in patients with associated diseases due to increased cardiometabolic requirements significantly affects the course of the disease, and thus the course and outcome of hospitalisation.

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The Assessment of Malnutrition Risk on Admission to a Covid Hospital with NRS-2002

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Background: Optimal nutrition is one of the fundamental prerequisites of a good health status. Malnutrition has been recognized as an important risk factor for adverse clinical outcomes in hospitalized patients, including an increased morbidity and mortality, longer hospitalization and higher readmission rate. Literature data show that the prevalence of hospital malnutrition ranges from 20 to 50%, depending on the population, hospital setting, applied methodology and the definition of malnutrition. Malnutrition risk in patients with COVID-19 is associated with comorbidities and decreased food intake caused by nausea, diarrhea and loss of appetite. Our study aimed to explore the association of malnutrition with the severity of COVID-19 disease and mortality.

Material and Methods: The prospective study enrolled the consecutive patients with confirmed SARS- CoV-2 infection admitted to Covid Hospital Batajnica from January till March 2022. The NRS 2002 score was used as the screening tool for malnutrition. Patient's clinical and demographic data were collected in the electronic database.

Results: During the study period 267 patients were screened. The mean patients' age was 71 years, and 178 (66.7%) were male. The median BMI was 20.7 kg/m², ranging from 13.8 kg/m² to 41.2 kg/m². There were 22 (8.2%) patients with low risk for malnutrition, 149 (55.8%) with moderate risk, and 96 (35.9%) patients with high risk for malnutrition, as assessed with NRS 2002. Patients in the high-risk group were significantly older and frail. The higher NRS 2002 value was associated with worse clinical outcome and longer hospital stay.

Conclusion: The first step in the fight against disease-related malnutrition is nutritional risk screening. We conclude that the NRS 2002 score intended for use in hospitalized patients is suitable for use in patients with COVID-19 disease. It correlates well with the disease severity and clinical outcomes. It's routine use may help create a nutrition strategy in patients hospitalized for COVID-19.

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Characteristics of COVID-19 after Allogeneic Stem Cell Transplantation

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Background: Patients who have undergone allogeneic hematopoietic stem cell transplantation (allo-HSCT) and who develop COVID-19 could have a poor prognosis, so it is important to improve surveillance strategies and preemptive measures.

Methods: We present 18 patients with COVID-19 in whom allo-HSCT was previously performed. Patients underwent allo-HSCT from March 2019-September 2020.

Results: Average age was 36.7(19-58) +/- 12.6 years. The diagnoses were as follows: 12 patients had AML, 4 patients had ALL, 1 severe SAA, 1 MDS. MUD transplantation was performed in 7, MMUD transplantation in 4, and MRD in 7 patients. Incompatibility in the ABO blood group system was present in 12 patients: 3 major, 5 minor, 4 bidirectional. The highest percentage (77.8%) of patients received myeloablative conditioning regimen.

CMV reactivation was verified in 15/18 (83%) patients immediately before and during COVID -19 infection; In 3/18(16.7%) patients invasive fungal infection was diagnosed at the time of COVID-19.

The median time from transplantation to COVID-19 was 11.5 (4-32) months, in patients who died from COVID-19 was 7.0 (6-7) months, and in those in whom COVID-19 did not lead to death it was 18(4-32) months (Fisher's Exact Test, $p=0.029$). Mortality from COVID 19 was 27.7%.. Severe form of COVID 19 infection had 7/18 (41.1%). Median survival from transplantation was 20.3 (4-35.4) months.

Conclusions: Mortality from COVID-19 was associated with a shorter time from transplantation to infection, and CMV reactivation was present in the majority of patients. In our experience, ongoing immunosuppressive therapy does not seem to affect the outcome.

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Guidelines For Prevention of SARS CoV-2 Infection Among Laboratory Staff and Assistants

Jelena Stojić¹

Background: The suggested prevention particularly during Covid-19 pandemia in daily routine practice is to minimize risk of infection. We all around the world got instructions on how to prevent infection in medical and daily practice. In medicine, it could be divided into: before, during and after work.

Methods: literature review of available evidence.

Results: In the era of digital medicine some specialists can avoid patients with imaging techniques. In some countries where digital pathology is developed the education and interobserver diagnosis can be established. But the risk of COVID-19 is higher in cases of sampling and processing of all tissues particularly in patients suspected of this infection.

Prevention and discretion of the risk of Covid-19 depends on handling with the tissue and 10% formaldehyde fixation. The high level of biohazard depends on the type of transport of fresh tissue samples that could be decreased in hospitals with pneumatic tubes and increased in cases with hospital courier. Unfortunately, the majority of the hospitals are not adequately equipped without triple packages of tissue and less availability for BSC-2.

The full personal protective equipment, including N95 face mask, face shield, cover-all biohazard suit, double gloves over a cut-resistant glove and boots and laminar air flow about the autopsy table directs aerosols away from personnel.

Conclusions: Pulmonary pathologists are particularly at high risk during the respiratory tissue sampling and processing. Fortunately, the days when the risk of COVID-19 seems to be reduced but it cannot be said that the infection could be forgotten yet. On the contrary.

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COVID-19 Related Autoimmune Myopathy- a Case Report and Literature Review

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Background: There is increased evidence that infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) may cause strong stimulation of the immune system leading to the development of autoantibodies, autoimmune-related symptoms and autoimmune diseases.

Methods: We present a case of a patient who developed autoimmune myopathy after coronavirus disease 2019 (COVID- 19).

Results: A 36-years old female patient presented with bilateral weakness in proximal muscles, limited limbs movement and poor tolerance to physical exertion. The symptoms developed 4 weeks after hospitalization for COVID-19 pneumonia and progressed rapidly. Blood work-up showed elevated CK (28,731 IU/L), LDH (2 882U/L), myoglobin (>1000ug/L), troponin (855ng/L). Immuno-serological analyses were positive for ANA 1:640 and myositis profile (Mi-2 ++, Ro-52 ++). Electromyoneurography revealed moderate to severe myopathic lesions with characteristics of inflammatory myopathies. Respiratory muscle strength testing showed decreased maximal inspiratory pressure of 62%. Lung CT scan and echocardiography were normal. Muscle biopsy and MRI were not performed due to pandemic conditions. COVID-19 related autoimmune myopathy was suspected. High dose of corticosteroids including pulse therapy along with Methotrexate were introduced. Since no clinical and laboratory response was achieved, intravenous immunoglobulins were given during 5 days with significant clinical improvement and gradual decline in muscle enzymes. After one year follow-up, she was still positive for ANA 1:640 and anti-Mi-2 antibodies with normal muscle enzymes.

Conclusion: The patients with progressive elevation of muscle enzymes should be evaluated for autoimmune myopathy triggered by COVID-19. Early diagnosis is important for adequate treatment and prevention of complications.

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Management Principles Of Cirrhotic Patients With COVID-19 – Our Approach and Experience from the Covid Hospital 'Batajnica'

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Background: Management of COVID-19 disease has specificities in patients with liver cirrhosis. Approach evaluation of COVID-19 cirrhotic patients is a prerequisite rendering better outcomes. Aim was to present management principles based on our experience.

Methods: Observational retrospective and comparative trial. Two group cohorts consisting of: n1=48 and n2=45 patients were matched in age, sex, aetiology and severity of cirrhosis. Diagnostic and treatment approaches were evaluated and compared.

Results: Patients in the inflammatory phase of the COVID-19 disease should be additionally differentiated with the use of procalcitonin (PCT) due to C-reactive protein's low predictive sensitivity for infections in liver disease ($p<0.005$). Use of low dose corticosteroid regimens in the inflammatory phase according to liver fibrosis stage had significantly better outcome results in terms of in-hospital mortality and length of stay (11% versus 15% of mortality and 10 versus 14 days; $p<0.05$). Low-molecular weight heparins (LMWH) given in therapeutic dosages yielded significantly improved control of inflammatory markers (mean PCT of 1.34 versus PCT of 2.17; $p<0.05$). Antibiotic prophylaxis with selective digestive decontamination therapy (metronidazole or fluoroquinolones) rendered significantly fewer complication rates ($p<0.05$).

Conclusion: Our recommended management is generally based on four principles: 1. Using PCT additionally is pivotal to determine the inflammatory phase of the COVID19 disease in cirrhosis; 2. Corticosteroids should be given in scaling low doses according to severity of liver fibrosis and preferably in the inflammatory phase; 3. Use of LMWH should be liberal with having possible impact on the course of inflammation itself; 4. Antibiotic prophylaxis should encompass selective digestive decontamination therapy.

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The Psychological Effect Of The COVID-19 Outbreak: Perceived Stress And Coping Strategies Among Students In Southeast Serbia

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Background: The COVID-19 pandemic has brought into focus the mental health of the student population. The study aimed to analyze the psychological effect of the COVID-19 outbreak in terms of perceived stress, coping strategies used to deal with stress and psychological distress among students in south-east Serbia. The study was conducted during the increasing incidence of COVID-19 cases during the spring of 2020.

Method: A total of 434 students from the public university in south-east Serbia enrolled in the study and completed the measures of socio-demographic data, Perceived stress scale (PSS-10), Coping strategy indicator (CSI) and General health questionnaire (GHQ-28). The data were analyzed through quantitative and qualitative methods.

Results: Mean perceived stress score was placed to 20.43 (± 7.67). The highest average values on CSI were on problem-solving, then seeking social support and avoidance. On the GHQ-28, the highest average values were on the anxiety/ insomnia subscale followed by the social dysfunction subscale, somatic complaints and the depression subscale. There was a statistically relevant negative and low correlation of the PSS-10 with problem-solving and a positive and high statistically relevant correlation of PSS-10 with avoidance. Also, there was a statistically relevant positive and high correlation of the PSS-10 with somatic complaints and depression and an even higher positive correlation with anxiety/insomnia.

Conclusion: The findings confirm the need to examine students' experiences in state of emergencies and crises, as well as to make a plan for online stress management programs that would help alleviate stress during a global pandemic.

Keywords: Students, COVID-19, psychological effect

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Detection of Micro Thromboembolization of Pulmonary Parenchyma by Perfusion Scintigraphy of the Lungs, in Patients after COVID-19 with Light Clinical Picture

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Background: Convalescence after Covid 19 with breathing difficulties, a negative multislice scanner (MSCT) and elevated D-dimer values may indicate pulmonary microthrombosis (PMT)

Methodology: In the period from 01.02.2021. to 02.01.2022., 48 patients after Covid 19 were referred for perfusion scintigraphy of the lungs (PLS). Patients with dyspnoea, elevated D-dimer values and negative MSCT were referred for PLS. PLS was done according to a standard protocol. In patients with PMT, control PLS and D-dimer analysis were performed after four weeks. Patients with PMT underwent anticoagulant therapy (AT) in the period from the first to the control PLS.

Results: Thirty men and 18 women. The mean age was 56 ± 14 years. PMT was found in 42 (87.5%) patients. All patients with PMT had elevated D-dimer values of $870 \pm 312 \mu\text{g/mL}$. Control PLS showed recovery of perfusion in 4 (11%) patients. Thirty-five (89%) patients had unchanged findings. A decrease of D-dimer values of $290 \pm 120 \mu\text{g/mL}$ was observed in all patients.

Covid 19 is accompanied by coagulation disorder, often causing PMT, with negative MSCT. Elevated D-dimer values and clinical signs may indicate PMT that can be detected with PLS. Subsegmental perfusion defects indicate the existence of PMT with normal MSCT. We consider persistent PMT with decreasing D-dimer values, as a sequelae.

Conclusion: Symptomatology, elevated D-dimer and negative MSCT in patients after Covid-19 indicate PMT. PLS is a valuable method for detecting PMT. Persistence of PMT on PLS with a decrease in D-dimer values, after AT considers as PMT sequelae caused by Covid-19 disease.

Keywords: Covid - 19; Perfusion scintigraphy of the lungs; Microthrombosis

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The Impact of the COVID-19 Pandemic on The Mental Health of Women in the Postpartum Period

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Introduction: The aim of our study was to assess the impact of the Covid-19 pandemic on the mental health of women in the postpartum period.

Method: We monitored 108 women in the postpartum period who completed the Edinburgh Postnatal Depression Scale (EPDS) and an additional questionnaire designed for the purpose of this research to assess mental status. The additional questionnaire mentioned above was also completed by 67 women, of appropriate age without detected mental disorder, with children at least 2 years old.

Results: In 16 (14.8%) women in the postpartum period, we found a score of 10 on the EPDS. Higher rates of EPDS were observed in the elderly, single, unemployed and women who lost their jobs or had insufficient household income due to the Covid-19 pandemic ($p < 0.05$). Deterioration of mental health was significantly associated with the application of restrictive measures designed to combat the possibility of infection (quarantine and social isolation), but also with the lack of social and material support, as well as emotional problems in the primary family. Postpartum women, compared to non-postpartum women, were more anxious and had a sense of helplessness during social isolation.

Conclusion: The Covid-19 pandemic impairs the mental health of women in the postpartum period. A comprehensive understanding of the impact of the Covid-19 pandemic on the mental health of women in the postpartum period is needed in order to devise adequate preventive measures to prevent the occurrence of mental disorders in this vulnerable group during future pandemics.

Key words: Covid-19 pandemic, postpartum period, mental disorders

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Quality of Sleep and Quality of Life in Health Workers Facing the COVID-19 Pandemic

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Introduction: The aim of the study was to assess quality of sleep (QoS) and quality of life (QoL) of healthcare professionals treating patients infected with SARS-CoV-2 coronavirus, as well as to quantify the existence and intensity of depressive symptoms and anxiety levels.

Method: The study included 201 healthcare workers who completed Generalized Anxiety Disorder assessment questionnaire (GAD-7), the Zung Depression Self-Assessment Scale, and a segment of questionnaires to assess quality of life dimensions such as: health activities, social life and general mental health (SF-36), quality of sleep assessment questionnaire (PSQI) and an additional questionnaire designed for research purposes.

Results: Healthcare professionals treating patients infected with SARS-CoV-2 coronavirus were more afraid of the possibility of infecting or transmitting the infection to a family member with significantly low self-esteem of their mental status. Poor QoL and QoS correlate with high levels of anxiety, more severe symptoms of depression, and several demographic characteristics. Higher scores on GAD-7 and lower scores on mental health (MH) subscales on the SF36 questionnaire, were independent predictors of higher PSQI score. Higher scores on GAD-7 and poorer self-perception of mental status were independent predictors of lower SF-36 scores.

Conclusion: The Covid-19 pandemic affects the mental health of health workers who treat infected patients, so it is necessary to provide them with some kind of psychological support.

Keywords: Covid-19 pandemic, quality of sleep, quality of life

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Psychological Status Of Hospitalized And Non-Hospitalized Patients Infected With SARS-CoV-2

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Background: The aim of our study was to assess the psychological status of hospitalized and non-hospitalized patients infected with SARS-CoV-2 coronavirus (Covid-19).

Method: The study included 257 infected patients (158 hospitalized and 99 self-isolated) who completed the Depression, Anxiety and Stress Assessment Scale (DASS-21), the Quality of Life Assessment Questionnaire (SF-36), the Insomnia Detection Scale (ISI), the Event Impact Scale (IES) with two subscales - Imposition (IES-I) and Avoidance (IES-AS) and a socio-demographic questionnaire.

Results: Patients who reported a higher frequency of symptoms on the IES-I subscale had higher scores on the anxiety subscale (0.376, $p < 0.001$), depression (0.292, $p < 0.001$), and stress (0.467, $p < 0.001$), and those who reported a higher incidence of symptoms on IES-AS subscales developed symptoms of anxiety (0.285, $p < 0.001$) and stress (0.350, $p < 0.001$). The presence of insomnia and stress reactions was more pronounced in hospitalized patients, Multiple linear regression analysis showed that lower scores on IES-A, higher scores on IES-I and hospital stay are good predictors of high results on the Stress subscale. Hospitalization, lower IES-AS scores, higher IES-I scores and male gender are significant predictors of higher scores on the depression subscale. Also, higher scores on IES-I as well as hospitalization are significant predictors of higher scores on the anxiety subscale.

Conclusion: Mandatory hospitalization of patients with Covid-19 is a significant predictor of anxiety, stress, depression and insomnia, as parameters of mental health disorders.

Keywords: Covid-19 pandemic, psychological status, stress, anxiety, depression

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Acute and Chronic Autoimmune Polyradiculoneuropathy During the COVID-19 Pandemic – The UCC Nis Experience

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Background: The aim of this study was to determine the impact of pandemic on patients with autoimmune acute (AIP) or chronic polyradiculoneuropathy (CIP).

Methods: A follow-up study was conducted during the period of 18 months (May 2020 till December 2021) on the 11 CIP diagnosed patients based on clearly defined criteria. The hospital history was also monitored in order to determine the newly diagnosed cases of AIP treated in the UCC Nis.

Results: Over 60% of patients were concerned about the pandemic, and among 55% of them it had a negative impact on daily activities. In up to 40% of patients, chronic immunomodulatory therapy is either completely ruled out or altered during the pandemic. Fear of pandemics ($\beta = -0.34$, $p < 0.05$) and age ($\beta = -0.35$, $p < 0.05$) were marked as independent predictors of poorer quality of life. Two patients with CIP had COVID-19; without significant symptoms of infection or worsening of the HIP symptoms. During the follow-up period, the incidence of patients with AIP increased by 50% compared to the period before the pandemic. Patients diagnosed with AIP did not differ significantly from patients diagnosed before the pandemic, and a similar therapeutic response was noted.

Conclusion: Professional psychosocial support and adequate therapeutic advice such as the development and implementation of telemedicine may be useful in monitoring patients with CIP during a pandemic. An increase in the incidence of patients with AIP during the pandemic period was noted, with no significant effect on clinical presentation or change in mortality.

Key words: COVID-19 pandemic, Acute autoimmune polyradiculoneuropathy, Chronic autoimmune polyradiculoneuropathy.

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The Impact of the COVID-19 Pandemic on The Impairment of Quality of Life and Sleep In Patients with Relapsing-Remitting Multiple Sclerosis

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Background: The aim of our study was to determine whether the pandemic caused by coronavirus 2019 (COVID-19) has, and to what extent, the impact on already impaired quality of life (QoL) and sleep (SQ) among patients with relapsing-remitting multiple sclerosis (RRMS).

Methods: We monitored 65 patients with RRMS with the following questionnaires: MSQOL-54 (quality of life questionnaire for patients with multiple sclerosis), PSQI (sleep quality questionnaire), self-designed questionnaire for collecting socio-demographic data which also included questions related to specific fears during the pandemic. Patients were examined with the mentioned questionnaires during April and May 2020., and were re-examined during the Spring and Summer of 2021.

Results: The main reason for fear in these patients at both times of the study during the pandemic was the fear of getting infected (78.5% and 73.7%). At the beginning of the pandemic, the scores obtained on the QoL questionnaire were worse than before the pandemic, but without a statistically significant difference ($p > 0.05$), and the results obtained in the SQ scores were statistically significantly worse than in the pre-pandemic period. (<0.01). The results obtained during the year of 2021, showed that there was no significant change in QoL (compared to 2020) with a slight improvement in the scores obtained for QoL, but there still was a statistically significant difference compared to the period before the pandemic ($p < 0.05$).

Conclusion: Patients with RRMS have fears associated with possible infection. There is also a significant negative impact on the QoL of these patients during the pandemic.

Key words: COVID-19, quality of life, quality of sleep, multiple sclerosis

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COVID-19 Pandemic and Autoimmune Acquired Myasthenia Gravis

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Background: The aim of our study was to determine whether the pandemic caused by coronavirus 2019 (COVID-19) has an impact on the psychological status of patients with myasthenia gravis (MG).

Methods: A study was conducted during the COVID-19 pandemic to examine the impact on the mental status of patients. Patients with MG who were tested in 2017 (64 patients) were examined using the same questionnaires: MGQOL15r (questionnaire for quality of life of patients with MG); PSQI (Sleep Quality Questionnaire); HAM-A (Hamilton Anxiety Scale), HAM-D (Hamilton Depression Scale). These patients were monitored so that in case they were positive for the presence of SARS CoV2 virus, the outcome of the disease and possible worsening of symptoms due to MG would be recorded.

Results: There was a statistically significant deterioration in sleep quality scores ($p < 0.01$) during the pandemic. As independent predictors of worse scores on the sleep quality questionnaires and quality of life were shown: more severe depression and more severe clinical manifestations of MG. Twelve patients (18.75%) with MG and confirmed COVID-19 were recorded by the end of 2021. Five patients reported worsening of MG symptoms during or after infection. Two deaths were reported during active COVID-19 and one significant worsening after infection (myasthenic crisis).

Conclusion: The COVID-19 pandemic has a significant impact on patients with MG, both in terms of deterioration of already impaired mental status and deterioration of the clinical presentation of MG or worse clinical picture and outcome of COVID-19 in case of infection.

Key words: COVID-19, miasthenia gravis, quality of sleep, quality of life.

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Prediction of COVID-19 Severity and Outcome in Hospitalized Patients Using Liver Function Test Values on Admission

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Background: Hepatic dysfunction associated with COVID-19 occurs in 10-58% of cases. In multiple studies a correlation has been found between elevated liver enzymes and a more severe course and adverse outcome of COVID-19. However, the role of liver enzymes on admission in correlation with disease outcome has not been clearly established.

Methods: This prospective observational study included 346 SARS-CoV-2 positive patients admitted to Clinical Center of Vojvodina from July to September 2020. Data collected included: leukocyte, neutrophil, platelet and lymphocyte counts, C-reactive protein, alanine-aminotransferase (ALT), aspartate-aminotransferase (AST) and gamma-glutamyl-transferase (GGT) values.

Results: 265 (76.6%) patients presented with elevated liver enzymes on admission, with predominant elevation of AST (252, 72.8%), followed by GGT (129, 37.3%) and ALT (105, 30.3%). No difference was found in baseline values of AST, ALT and GGT between patients who died and those who survived ($p>0.05$), nor between groups requiring different levels of respiratory support ($p>0.05$). Only exception was GGT whose baseline elevation was associated with more frequent need for oxygen supplementation via mask compared to no-oxygen requirement (73.6%vs.59.4%, $p=0.045$). However, baseline FIB4 score was significantly higher in patients with lethal outcome (3.6vs.2.3, $p<0.001$). Patients with FIB4 in the "fibrosis" range had 4.84 (95%CI 2.48-9.43) higher odds of dying from COVID-19.

Conclusions: Baseline elevation of liver enzymes can not serve as a predictor of neither mortality nor the type of respiratory support required during hospitalization for COVID-19. FIB4 on admission was significantly higher in COVID-19 patients with poor outcome, suggesting a new, potentially valuable use of this well-known score.

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Coagulation Disturbance in Kidney Patients With COVID-19

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Introduction: It has been observed that there is an association between renal function verified on admission to hospital and the treatment outcome of patients infected with COVID-19. Patients with various chronic diseases such as diabetes, hypertension, obesity, cardiovascular diseases, malignancies, chronic lung diseases are at special risk for kidney damage in COVID-19. The basis of the development of kidney disease is, among others, the activation of the coagulation system.

The aim of this study was to determine the presence of coagulation disturbance in renal patients with COVID-19.

Methods: Coagulation disturbance in renal patients with COVID-19 during hospital treatment were analysed. Patients were analysed according to clinical picture and values of dDimer, prothrombin time (PT), aPTT, platelet count and PDW.

Results: In general in all subjects, D dimer was significantly different from other examined parameters of coagulation status: minimum value D dimer 523ng/ml and maximum >20000 ng/ml, and correlates with comorbidities and severity of COVID 19 infections.

Conclusion: Kidney damage is an already known prothrombotic condition that increases the risk of thromboembolic complications. On the other hand, reduced kidney function is a limiting criterion for the use of most anticoagulant drugs.

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Operative Treatment of Patients With Fractures in Nis During COVID-19 Pandemic

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Background: The epidemic of COVID-19 virus in Serbia began on March 6, 2020 with the first confirmed positive test. The newly introduced measures against the spread of the epidemic included a 54-day curfew, limited working hours of services and a ban on mass gatherings. Since introduced measures affected the freedom of movement and activity of population, the aim of this paper was to compare the distribution of fractures that were operatively treated at Clinic for Orthopaedic Surgery and Traumatology in Nis with the same period in 2019.

Methods: The observed periods in both years lasted from March 6 to December 31. In 2019, there were 650, and in 2020, 630 operated trauma patients. Patients were divided into groups of fractures based on their anatomical localization, the number of fractures was compared, as well as age and sex distribution of patients.

Results: Our results showed that there is no statistically significant difference in the total number of operated patients in the two observed intervals. The most common were fractures of trochanteric region and tibial shaft with almost identical age and sex distribution. Only the number of malleolus and proximal humerus fractures showed a significant decline in the pandemic year.

Conclusions: Despite the newly emerging epidemiological situation, the scope of traumatological activities at the Clinic for Orthopaedics in Nis has remained almost unchanged. Approximate number of operated patients in these two periods indicates that the most of our patients suffered injuries during daily activities at home, which weren't affected by restriction of movement and other pandemic conditions.

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Glycemic Control and Vaccinal Status of Hospitalized Patients with Diabetes in Covid Hospital KBC Zvezdara

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Introduction: Diabetes has been recognized as a risk factor that increases the rate of hospitalization and the risk of mortality in COVID-19. Poor glycemic control is known to impair several aspects of the immune response to viral infection, and also affect potential secondary bacterial infection in the lungs of patients with diabetes.

Methods: This is a retrospective study that included hospitalized patients during the in KBC Zvezdara. In addition to demographic characteristics, history of diabetes, its duration, and diabetes therapy, we analyzed glycosylated hemoglobin (HbA1c), C-reactive protein (CRP) and vaccine status. Patients were elderly with comorbidities, and HbA1c $\geq 7.5\%$ was a marker of good glucoregulation.

Results: Of the 3664 patients, 960 had diabetes (26.2%). Gender distribution: 62.3% men and 37.7% women. Mean age of 70.52 ± 8.3 years. Most patients had a duration of diabetes of more than 10 years (52.5%), 37.7% had them had diabetes up to 10 years. De novo diabetes was detected in 9.8% of patients. The mean value (HbA1c) was $7.91 \pm 1.77\%$. In newly discovered HbA1c it was $9.93 \pm 2.17\%$ and in others $7.67 \pm 0.49\%$ ($H = 11.04$; $p < 0.05$). Prior to admission, 46.8% took oral hypoglycemic agents, 17.7% took insulin combination therapy (BOT), and 35.4% were on insulin therapy alone. Patients with HbA1c $\geq 7.5\%$ had higher CRP, and we found a statistically significant difference between these groups ($U = 237.5$; $p \leq 0.05$). There were only 14.8% of vaccinated patients. We did not prove a correlation between vaccine status and CRP.

Conclusion: Men over the age of 70, with an average duration of diabetes of more than 10 years, unvaccinated, were more affected by COVID-19. Newly diagnosed diabetics had poorer glucoregulation. Poor glucoregulation affects the inflammatory process, CRPa and outcome of the disease.

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COVID-19 in Patients With Chronic Myeloid Leukemia on Tyrosine Kinase Inhibitor Therapy - One Center Experience

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Background: The treatment of patients with hematological malignancies including chronic myeloid leukemia (CML) is a challenge at the time of the COVID-19 pandemic. The aim of this study was to analyze data on the outcome of COVID-19 in patients with CML on tyrosine kinase inhibitor (TKI) therapy.

Methods: A cohort of CML patients who had a previously confirmed COVID-19 in the period from March 2020 to February 2022 was retrospectively examined. Basic characteristics of patients and treatment, severity of the infection and clinical outcome were analyzed.

Results: In the study group, 59.9% of patients were younger than 65 years, and females were predominant with 63.6%. The average time from diagnosis of CML to COVID-19 was 7.3 years. At the time of diagnosis of the COVID-19, 81.8% of patients were on first-generation TKI therapy-imatinib. An estimated 68.3% of patients achieved a molecular therapeutic response to TKI at the time of infection. A total of 86.4% of patients had a symptomatic disease. According to the WHO criteria, asymptomatic/mild symptoms of COVID-19 were seen in 59.1%, moderate symptoms in 18.2%, severe/critical symptoms in only 22.7% of patients. Discontinuation of TKI therapy during COVID-19 was observed in 63.7% of patients. There were no deaths due to COVID-19.

Conclusion: Although the sample size is still small to draw conclusions about the behavior of COVID-19 in CML patients, in this analysis most HML patients treated with TKI had a mild clinical course of COVID-19 with complete recovery.

Key words: chronic myeloid leukemia, COVID-19, tyrosine kinase inhibitors

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The Impact of the COVID-19 Pandemic on Melanoma Thickness: A Single Center Experience

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Background: The COVID-19 pandemic has had a drastic impact on the health care systems and has led to profound change in priorities in health care services, thus reducing the number of non-urgent medical visitations to a minimum. The delayed diagnosis of melanoma adversely affects the outcome and survival rates, therefore prompt recognition is mandatory.

Methods: A retrospective study of melanoma patients was conducted at the University Clinical Center of Niš beginning from March 2019 until February 2021. We sought to evaluate the impact of the COVID-19 pandemic and lockdown on Breslow thickness in patients with melanoma between March 2019 and February 2020 (pre-COVID-19 period) and compare to the corresponding period in 2020 and 2021 (COVID-19 period). According to Breslow thickness, patients were separated into 3 categories (less than 1 mm, 1-4 mm, and more than 4 mm).

Results: A total of 148 patients with melanoma (88 male and 60 female) were diagnosed between March 2019 and February 2021. Out of the 148 patients, 80 patients (49 male and 31 female) were diagnosed before COVID-19 pandemic, while 68 patients (39 male and 29 female) were diagnosed during the COVID-19 period. The number of diagnosed melanoma patients in the COVID-19 period was reduced compared to the pre-COVID-19 period (68 patients vs. 80 patients; 15% reduction in diagnosed melanoma). Regarding the Breslow thickness, the number of patients with Breslow thickness of more than 4 mm was significantly higher in the COVID-19 period (31 vs. 18; $p=0.019$).

Conclusion: Delayed and reduced diagnosis of new cases of melanoma are to be expected due to the COVID-19 pandemic.

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Comparative Analysis of the Impact of SARS CoV-2 Infection on Spermogram Parameters of Vaccinated and Unvaccinated Patients with Moderate and Mild Clinical Picture

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Introduction: Considering the young population of men, the effects of viral infection on the parameters of spermatogenesis of vaccinated in relation to unvaccinated patients with moderate and mild clinical picture were analyzed.

Methods: The parameters of spermatogenesis of 141 patients examined at the University Clinical Center in Nis due to SARS CoV-2 virus infection with moderate and mild clinical presentation in the period from September to December 2021 were analyzed. All vaccines were considered collectively without grouping according to the type of vaccine administered. The total number of spermatozoa, motility, as well as morphological structure by grading on the basis of scale were compared, after 15, 30 and 40 of the infection. Comet assay of spermatid DNA fragmentation was determined after infection with the aim of detecting changes in DNA fragmentation after 30 days.

Results: The number of spermatozoa showed a statistically significantly smaller decrease in the vaccinated compared to the unvaccinated after 15 days ($p < 0.05$). After 30 days, almost all vaccinated patients had a spermogram comparison comparable to the findings before infection. In unvaccinated patients, 3/62 patients developed spermatocyte arrest, which was verified by testicular biopsy after 30 days. Unvaccinated patients had a statistically significantly lower sperm count even 40 days after infection. Sperm motility was significantly lower in all unvaccinated patients throughout the follow-up period than in the vaccinated group ($p < 0.05$). Sperm morphology showed comparative findings in both groups, probably due to the short follow-up time.

Conclusion: Vaccination against SARS Cov 19 infection has indisputably shown protective effects on spermatogenesis parameters in patients with moderate and mild clinical picture of Sars Cov 19 virus infection.

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Telogen Effluvium After SARS-CoV-2 Infection: A Case Report

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Background: According to published literature, the incidence of dermatological lesions in COVID-19 ranges from 0.6 - 20.4%. Hair loss after recovery from COVID-19 is becoming a prominent dermal manifestation, with acute telogen effluvium (TE) being a common occurrence. TE is defined as diffuse hair loss that occurs 8 to 12 weeks after a stressful event like febrile states, drugs, and postpartum period.

Methods: A literature search was carried out using MEDLINE/PubMed and Embase databases for studies published from December, 2019 till 5th of October, 2021.

Results: A 68-year-old female came to the dermatological clinic, 3 months after COVID-19, for hair loss. On the physical examination, a decrease in hair density was evident. The pull test was extremely positive. Trichoscopy showed reduction in hair density, some empty follicles. An incidental dermoscopic finding, basal cell carcinoma (BCC) in the frontoparietal regions. Oral multivitamin supplements and topical lotions, i.e. hair growth stimulants, were prescribed.

Conclusions: Our case showed TE, 3 months after the onset of SARS-CoV-2 infection, thus earlier than classic TE, but trichoscopic features showed no variations from classic TE. Different pathogenetic mechanisms including pro-inflammatory cytokines and direct viral damage on the hair follicle can be hypothesized. Further studies are needed to improve current understanding of this condition.

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Markers Of Sepsis And Depletion Of Peripheral CD4+ And CD8+ T Cells In Critically Ill Patients With COVID-19

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Background: Current findings from numerous studies suggest that immune-inflammatory response plays a key role in pathophysiology of COVID-19. In short, related to severe forms of disease, the release of a large number of molecules associated with the pathogen and the resulting damages leads to inflammatory hyperactivation ("cytokine storm"), causing sepsis, multiorgan dysfunction (MODS) and possible death. The aim of the study was to determine the presence of the above conditions and significance of peripheral T lymphocyte number in critically ill patients.

Methods: By random selection were examined 20 patients on invasive mechanical ventilation (as inclusion criterion), aged on the average 72,3±SD13.91 years. Laboratory markers of sepsis were determined, as well as the number of CD4+ and CD8+ T cells by flow cytometry.

Results: All the patients met the criteria for sepsis and MODS. Independent factors associated with mortality were age (OR=1.108;CI95%1.031-1.190;p=0.005), reduced counts of CD4+ (OR =0.996;CI95%0.992-0.999;p=0.022) and CD8+ cells (OR=0.995;CI95%0.990-0.999;p=0.028). The first 28 days after hospitalization only the two youngest patients survived (43 and 50 years of age), who had the CD4 lymphocyte counts above 500/μL and a CD4/CD8 ratio over 1. Conclusion: Immunosenescence is the hallmark of the aging process. Is characterized by reduced regenerative capacity of acquired immunity. In SARS-CoV-2 infected elderly patients further deterioration of pre-existing lymphocyte depletion leads to an uncontrolled systemic inflammatory response, which is the primary cause of death. More thorough understanding of this complex interplay between innate and acquired immunity might better explain the severe forms of kovid 19, sepsis itself, and post-covid-related conditions.

Keywords: COVID-19; critical illness; depletion of CD4+and CD8+ T cells

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The Impact of The COVID-19 Pandemic on Paediatric Appendicitis Management and Outcomes

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Background: The pandemic caused by the SARS-CoV-2 virus had a significant impact on providing health services over the world and is reflected in paediatric surgery also. The aim of this study was to determine the differences in the prevalence of forms of appendicitis among children during and prior to the pandemic, and to compare the demographic characteristics.

Methods: A retrospective study which covered a period from September 1, 2018 until September 1, 2021 and all the patients who underwent surgery for acute appendicitis was carried out. Demographic and clinical data were collected and analysed.

Results: The study included a total of 267 patients. Prior to the pandemic a total of 160 children underwent surgical treatment, 61.9% boys and 38.1% girls, while during the pandemic a total of 107 underwent surgical treatment, mostly boys 68.2%, and to a lesser extent, girls 31.8%. The average age of the patients was 11.0 ± 3.9 years. Even though there is a difference in the number of children who underwent surgical treatment for perforated appendicitis prior to and during the Covid-19 pandemic, 54 vs 44 or 33.8 vs 41.1%, the difference is not statistically significant. During the pandemic, two patients who tested positive for the SARSCoV-2 virus received surgical treatment for a perforated appendicitis.

Conclusion: The Covid-19 pandemic had an impact on the healthcare system worldwide. In most centres for paediatric surgery, there was an increased incidence of perforated appendicitis without significant deviations in the demographic characteristics, which correlates with the results of this study.

Key words: appendicitis, children, Covid-19 pandemic.

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Pneumothorax In Patients With COVID-19 In Covid Facility 4 UCC Niš

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Background: Immediately after the proclamation of the COVID-19 pandemic in March 2020, it was confirmed that the COVID-19 affects the entire organism causing numerous complications. Pneumothorax is a life-threatening complication in COVID-19.

Methods: A retrospective study included patients suffering from COVID-19 with the appearance of pneumothorax in COVID facility 4 UCC Nis, in the period from September 10, 2021 until February 15, 2022. The observed factors in this study were: sex, age, body side from which pneumothorax appeared, whether the patient was on mechanical ventilation, number of hospitalization days and mortality.

Results: In this period, 1135 patients were treated for COVID-19; pneumothorax occurred in 18 patients (1.59%), more often in men (61.11%) as compared to women (38.89%), more often on the right side (66.67%) than on the left (27, 78%), and in 5.56% it was observed on both sides. The average age was 60.89 years. 22.22% of the patients were on mechanical ventilation. Therapeutic chest tube thoracostomy was performed in 94.44% of the cases, observation was applied in 5.56% of the cases. The overall mortality rate was 33.33%, with a mortality rate of 100% in the patients who were on mechanical ventilation. The dominant symptom in all patients with pneumothorax was a persistent, strong, irritating cough. The average number of hospitalization days was 9.83 days.

Conclusion: The overall incidence of pneumothorax in COVID-19 patients was 1.59%, more common in middle-aged men, on the right side of the body, with an average mortality of 33.33% and a mortality of 100% in the patients who were on mechanical ventilation. Cough and mechanical ventilation are the leading risk factors for the development of pneumothorax in COVID-19 patients. A chest tube thoracostomy is most commonly used in surgical therapy.

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Neurologic Changes In The Course Of COVID-19, a Case Report

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Background: First identified in China at the end of 2019, COVID-19 has quickly become a global world issue. Its mutations and variable clinical manifestations have, since then, puzzled researchers every day together with the problems it created.

Since first reported cases which showed that the virus causes severe respiratory tract problems, researchers have learned that COVID-19 is a multisystem disorder.

Methods: Authors have shown a case of a male patient, aged 70, with confirmed COVID-19 and neurological manifestations, who was treated in the Infectious Diseases Clinic of the Clinical Centre in Niš.

Results: On admittance to the clinic on the ninth day since the disease began because of deterioration of his condition, bilateral pneumonia and respiratory insufficiency. He also developed nervous complications in the form of encephalopathy or encephalitis with sensory disturbances from somnolence to deep coma.

He also had burdening factors such as diabetes and elevated blood pressure and was not vaccinated. Due to the suspicion of haemorrhage and brain infarction, a lumbar puncture was performed which obtained a clear cerebrospinal fluid without any leukocytes present, a few erythrocytes and microproteins 1.09 mg/L. The disease had a progressive course which lead to exitus letalis.

Conclusion: Treatment of people who suffer from COVID-19 requires a multidisciplinary approach, and because of this, there is a need to modify current protocols, with the aim of providing better care and therapy against COVID-19 for the patients with neurological symptoms.

Key words: COVID-19, neurological complications, encephalopathy, somnolence, coma

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Herpes Zoster In COVID-19 Positive Patient – a Case Report

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Background: Herpes zoster (HZ), a distinctive syndrome induced by reactivation of varicella zoster virus (VZV), is primarily an infectious dermatosis with a high incidence of sequelae, and it requires long-term treatment.

Coronavirus disease (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, has been associated with T cell immune dysfunction and there have been reports of HZ in COVID-19 patients.

During the COVID-19 pandemic, HZ was reported among all age groups, including young immunocompetent people of the ages of seven, nine and elderly people with HZ ophthalmicus.

We present a patient with HZ ophthalmicus, who was treated at the University Clinical Centre Niš during the first wave of the COVID-19 pandemic in May 2020.

Case report: The patient, aged 70, was treated for bilateral pneumonia caused by COVID-19 at the Clinic for Pulmonary Diseases. She was reported to have necrotic HZ affecting the ophthalmic branch of the trigeminal nerve. In addition to this, a dermatologist noted the presence of lesions of the adenoma sebaceous type on the face, as well as the presence of periungual Koenen tumours on the feet, which led to the detection of an uncommon disorder genodermatosis – Sclerosis Tuberosa (Morbus Bourneville-Pringle), in the modern literature referred to as Tuberous Sclerosis Complex (TSC).

The treatment of HZ in COVID-19-infected patients is common and implies the use of acyclovir (a regular dosage), analgesics, topical and ocular medications.

Cutaneous postherpetic changes in our patients were manifested intensively in the form of post inflammatory scarring, followed by the development of the left-eye ectropion (which was intended to be treated by an ophthalmologist).

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Conclusions: Reactivation of herpes zoster (HZ) during the acute or subacute phase of COVID-19 was related to the decline in the varicella zoster virus-specific cell-mediated immunity.

Thanks to the participation of dermatologists in the treatment of Covid-19, the patient was adequately attended to and treated for the HZV. Moreover, an uncommon genodermatosis belonging to the group of phakomatosis – Tuberous Sclerosis Complex (TSC) was also detected.

Consultative-liaison Psychiatry in Patients with COVID-19 Disease, Case Report

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Background: Psychiatric syndromes in hospitalized patients with COVID-19 influence patients behavior in illness. Maladaptation, agitation, disorientation, unreasonable requests for discharge, fear of death are reasons for psychiatric consultation.

Methods: Retrospective study of data concerning psychiatric consultations in covid departments.

Results: In Clinical center Niš there were 340 psychiatric consultations from April 2020 to January 2022. The most frequent were diagnosis of acute mental disorder due to medical condition and accommodation disorders. Our experience in consultation –liaison work refers to psychological and psychopathologic aspects of patients, family members and medical staff which are also in specific ways affected by disease. Psychiatrist work in covid- wards has some specifics. Diagnostic interview with patients is limited due to the circumstances of doctor –patient contact: lack of face to face interaction due to face mask, protective suit and glasses, limited time of interaction and mental exhaustion of the patient. Therefore observation, medical data and heteroanamnesic information are the basis for diagnosis. Our case report refers to a father and son with covid infection, their psychological reaction and panic disorder developed in their son after the father has died. Supportive psychotherapy and antidepressants were applied resulting in reducing panic attacks and improvement in functioning.

Conclusion: After the fatal outcome of covid-19 disease, vulnerable family members should receive psychological help to prevent psychiatric disorders.

Key words: Psychiatric consultation, patients with covid -19, family members

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Myocarditis as a Complication of COVID-19

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Background: During the pandemic caused by the COVID-19 virus, numerous findings were made about the nature of this disease, and in addition to the initial understanding that it was a respiratory infection, it was concluded that it is a multisystem disease with numerous extrapulmonary manifestations. Cardiovascular complications of COVID-19, including myocarditis, have been described as relatively common in the adult population. Myocarditis is an inflammation of the heart muscle that manifests itself in a wide range of symptoms, most often caused by viruses.

Case report: A 32-year-old male patient was admitted to the Clinic of Cardiovascular Diseases of the University Clinical Center Nis with the feeling of irregular heartbeat and stabbing in the left half of the chest. From his personal anamnesis, it is known that he has not had any previous history of cardiovascular diseases, that he was positive for the SARS-CoV-2 virus a month before the start of hospital treatment, and that he was not vaccinated. During hospitalization, laboratory analysis, echocardiography, 24-hour holter electrocardiogram (ECG) and magnetic resonance imaging (MRI) were performed. MRI showed minor fibrotic changes in the segments affected by myocarditis, without signs of active inflammation at the time of examination.

Conclusion: Patients with COVID-19 may develop serious cardiac complications, such as myocarditis and heart failure. This review highlights the importance for further research related to the diagnosis and treatment of cardiovascular manifestations in patients with COVID-19.

Keywords: COVID-19, myocarditis, cardiovascular complications, magnetic resonance imaging.

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Case Fatality Rate of Non-COVID-19 Patients in Tertiary Health Institutions Before and after the Pandemic

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Background: The Covid19 pandemic significantly disrupted the treatment of hospital patients with other diseases due to the priority engagement of human and material resources in the treatment of COVID-19 patients. The extent to which this disorder affected the case fatality rate of non-Covid-19 patients has not yet been investigated in detail.

Objective: To examine the trends of hospital case fatality rate and the length of hospital treatment in a tertiary health care institution for the period covering three years before the start of the pandemic, and two years of the pandemic.

Methods: Case fatality rates (total and in the first 48 hours) were collected from the Information system of the University Clinical Center Kragujevac, Serbia, for the period from 2017 to 2021, both for the institution as a whole and for internal medicine, surgery, gynecology and pediatrics. The trends are presented graphically, and their significance was examined by Mann-Kendall's trend test.

Results: There was no significant trend in case fatality rate at the level of the entire institution, but with the onset of the pandemic, there was a significant shortening of hospital stays (from 6.26 to 4.48 days on average). Case fatality rate in the first 48 hours increased significantly in patients of surgical disciplines with the onset of a pandemic, while the case fatality rate in the first 48 hours and overall case fatality rate decreased significantly in patients of internal medicine disciplines. In pediatric patients, there was an increase in the case fatality rate with the onset of the pandemic, both in total and calculated for the first 48 hours of hospitalization. There were no changes in case fatality rate in gynecological patients.

Conclusions: Due to the burden caused by the COVID-19 pandemic in tertiary health care institutions, non-COVID-19 patients from vulnerable groups - surgical and pediatric - have the most severe consequences. In emergency situations, it is necessary to pay special attention to hospitalized children and patients who need surgical intervention, in order to avoid adverse outcomes.

Key words: fatality rate, non-COVID19 patients, health care institutions

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Clinical Characteristics of Patients with Type 2 Diabetes Mellitus Hospitalized For Coronavirus Disease 2019

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Background: Diabetes mellitus type 2 (T2DM) has been shown to be a risk factor for COVID-19 and its severity.

Methods: We retrospectively reviewed 594 consecutive hospitalized COVID-19 patients with or without T2DM at Covid Department of the University Clinical Center (UCC) Niš, Serbia, recruited from September 10 to December 31, 2021. The hospitalization length, laboratory findings, vaccination status were collected and analyzed.

Results: There were 124 patients (21.0%) with T2DM who were hospitalized and there were 470 (79.0%) non-diabetic patients. The median age of the diabetic patients was 62.2 ± 16.3 , ranging from 17 to 91 years of age. Men with diabetes were significantly younger than women (60.6 ± 16.8 vs 64.2 ± 15.3 , $p < 0.01$). Patients with T2DM had no significant differences in gender and age with non-diabetic patients ($p > 0.01$). There were significantly more vaccinated patients with T2DM against COVID-19, 70 (56.5%) than non-diabetic patients 142 (30.1%). The average hospitalization length in diabetic patients was 20.2 ± 9.6 (from 5 to 54 days) and it was significantly longer ($p < 0.01$) than in non-diabetic patients 15.0 ± 9.4 days ranged from 3 to 39 days. Serum levels of CRP were much higher in diabetic patients and ranged from 2.2 to 325.0 and creatinine ranged from 45.0 to 771.4 than in those without diabetes (the CRP range from 1.0 to 224.0; the creatinine ranged from 42.0 up to 663.0). The diabetes group had a significantly higher average serum levels of CRP ($p < 0.01$) and creatinine than non-diabetic group ($p < 0.01$). The diabetes group had a significantly higher rate of preexisting comorbidities (65.0%, $p < 0.001$) than non-diabetic group (48%).

Conclusion: Diabetes mellitus is associated with increased disease severity of COVID-19 according to hospitalization length, vaccination status and laboratory findings (CRP, serum creatinine).

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Specificity of Urological Consultative Examinations in the Covid Zone

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Background: The epidemic caused by the Covid 19 virus has led to the necessary changes in the organization of clinical work as well as the implementation of standard diagnostic and therapeutic protocols. The aim of this research is to evaluate urological consultative examinations in the Covid zone of the University Clinical Center (UCC) Nis.

Methods: A retrospective study analyzed consultative examinations of urologists in the Covid zone of UCC Nis in the period from February 1, 2021 to February 1, 2022, through the following data: type of consultative examination, patient location (Covid department or ICU), as well as applied therapy.

Results: Out of a total of 382 consultative examinations, 135 were in Covid departments and 247 in the ICU. The most common indications for consultative examination were: hematuria (n=144) and bladder catheterization (n=121). In the majority of cases, minor urological interventions were performed in the patient's bed (41%), such as placement of a urinary catheter and urinary bladder lavage. A total of 7 surgical procedures were performed, due to: retroperitoneal hematoma (n=3), Fournier's gangrene (n=1), perirenal abscess (n=1), bladder tamponade (n=1) and percutaneous nephrostomy placement (n=1).

Conclusions: Consultations due to catheterization and bladder lavage dominate among the consultative examinations. We believe that it is necessary to constantly educate the medical staff in the Covid zone regarding the procedures and skills in placing and maintaining a permanent urinary catheter.

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Mental Distress and Psychiatric Disorders Prevalence in the Second Year of C-19 Pandemic in Serbia: Results of the Nationally-Representative Survey Cov2soul.rs

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Background: Viral outbreaks are associated with short and long-term consequences and passage of time is needed to estimate the overall impact of Covid-19 on mental health in the general population. Country-specific studies to identify the mental health needs after the prolonged duration of the pandemic are still rare.

Methods: This hybrid study combined an in-person cross-sectional evaluation to estimate the period prevalence of common psychiatric disorders and suicidality in the adult population of Serbia (18-65 years) with a follow-up telephone survey to explore changes in mental distress and perception of COVID-19 pandemic consequences on various aspects of life during the second year of the pandemic. A nationally representative sample was collected using multistage probabilistic household sampling and combined diagnostic interviews (M.I.N.I. 7.0.2 Standard), self-report instruments of the general distress (PHQ-9; GAD-7), and scale for the perception of the pandemic created by the authors. Trial registration number: NCT04896983.

Results: The prevalence of common mental disorders (n=1203) was around 7% for internalizing disorders (depressive, anxiety disorders and suicidality) and 8% for externalizing disorders (substance use disorders). The prevalence of the adult population with distress varies concerning the stringency of distress criteria. Perception of the pandemic varied significantly through the observed period.

Conclusion: In the otherwise under-researched region, this study for the first time provides nationally representative estimates for the prevalence of psychiatric disorders. Present data contribute to the global knowledge on the levels of distress after prolonged living with the pandemic.

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Mortality From SARS-CoV-2 Infection in Dialysis-Dependent Patients

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Background: A worse treatment outcome for Sars-CoV-2 infection can be expected in dialysis-dependent patients due to the higher number of comorbidities and immunocompromised state.

Methods: A retrospective study on 46 dialysis patients, infected with Sars-CoV-2, treated at the Clinical Center of Vojvodina (March 2020 - February 2021). Clinical data and laboratory tests were collected and compared.

Results: Out of 46 patients (56.52% male, 43.48% female, average age 64.2 years) 28.26% died. Age, gender, drugs use (the renin-angiotensin-aldosterone system inhibition, azithromycin, corticosteroids, tocilizumab) didn't affect mortality. The presence of diabetes, three or more comorbidities and the poor general condition increased the mortality risk. The dialysis age, diuresis above 500ml or the presence of cough, dyspnea, fever, diarrhoea or arthralgia/myalgia did not affect mortality. Pts who died had more respirations per minute (20.15 vs. 16.39), lower oxygen saturation (89.31% vs. 95.97%), and had X-ray confirmed pneumonia (100% vs. 72.73%) at the baseline. Pts who died had higher neutrophil (6.7×10^9 vs. 3.8×10^9) and leukocyte (8.41×10^9 vs. 5.18×10^9) count, neutrophil-lymphocyte ratio (12.12 vs. 5.77), and D-dimer levels (3377.92 vs. 1589.27ng/ml). The need for hospitalisation, for continuous renal replacement therapy (50% vs. 16.67%) and for oxygen therapy (no O₂ th 0%, non-invasive O₂ th 40%, mechanical ventilation 63.64%) increased the mortality risk.

Conclusions: Mortality during Sars-CoV-2 infection in dialysis patients is affected by the presence of diabetes, more than two comorbidities, general condition, elevated leukocytes, neutrophils, NLR and D dimer and the presence of pneumonia with respiratory failure requiring oxygen therapy and hospitalisation.

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Efficiency of Monoclonal Antibodies Among COVID-19 Patients

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Background. Neutralizing IgG class monoclonal antibodies, bamlanivimab, are used to treat mild forms of recently diagnosed COVID-19 in patients at high risk of developing severe disease. Monoclonal antibodies block the fusion of cell membrane and virus by binding to the domain binding receptor (RBD) of surface S protein. Therefore, S protein is a rational target of monoclonal antibodies based therapy, considering the prolonged viral load is associated with severe COVID 19 illness and possible fatal outcome.

Methods. The study was conducted at the Clinic for Infectious Diseases, University Clinical Center of Nis, in the period from August 2021 to January 2022. It included 43 patients, of which 18 women with an average age of 68 ± 10 years and 25 men with an average age of 66 ± 20 years. Of the total number of patients, 31 (72%) were with cardiovascular diseases, while 15 (48%) reported diabetes mellitus as the second comorbidity. There were 15 oncology patients (35%). Bamlanivimab was administered within 3 days of infection, in a single dose of 700 mg.

Results. All of 43 patients did not develop a severe form after receiving the drug in the early phase of disease, also there was no COVID-19-related hospitalization.

Conclusions. Treatment with neutralizing monoclonal antibodies in the early phase of COVID-19 in a high percentage reduces the risk of hospitalization and development of a severe illness. In the presented patients, they justified the significance of their original name "magic bullet". The emergence of new serotypes of SARS-CoV-2 virus, with significant changes of the S protein, indicates the use of combined monoclonal antibodies (cocktails), targeting highly conserved regions of S protein.

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Gastrointestinal Bleeding In COVID-19

- Case Report

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Background: Gastrointestinal bleeding is an uncommon clinical presentation of Coronavirus disease 2019 (COVID-19). The risk of gastrointestinal hemorrhage is higher in COVID-19 patients, due to increased usage of anticoagulation and corticosteroids, as well as possible unknown mechanism of SARS-CoV-2 virus to gastrointestinal mucosa. We presented a case of patients with COVID-19 and gastrointestinal bleeding as the first presentation.

Methods and Results: A 70-year-old man was admitted due to melena, subfebrile temperature and back pain. In the last month, he started using Dabigatran, due to atrial fibrillation.

On admission, the patient was stable. Physical examination revealed rare crackles. Rectal examination revealed melena.

Initial laboratory investigations revealed anemia, prerenal azotemia and positive inflammatory syndrome. Initial Chest X-ray was normal. During upper endoscopy fresh erosions in the distal corpus of the stomach was noted, but without active bleeding.

During the following days, there has been a slight deterioration in his respiratory status, laboratory analyzes and radiological findings. The patient was treated with methylprednisolone, antibiotics, proton pump inhibitor, low molecular weight heparin and other symptomatic and supportive therapy. The patient was discharged on the 18th day in stable condition.

Conclusion: The risk of gastrointestinal bleeding is higher in patients with COVID infection, for several reasons. Timely and adequate diagnosis and therapy are very important. The gastroenterologist must assess the risk and benefit of undertaking endoscopy in these patients, but also the risk of infection for the endoscopic team.

Keywords: COVID-19, melena, anticoagulation, endoscopy

Note: The above abstract was submitted in the form of in extenso paper for publication in the Serbian Archives of Medicine and is in the process of editorial evaluation.

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Analysis of The Significance of Comorbidities for the Death of COVID-19 Patients Hospitalised in the Clinic for Lung Diseases UKC Nis

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Background: The World Health Organization announced the Coronavirus Disease 2019 (COVID 19) pandemic and its serious threat to global health on March 11, 2020. The aim of this study was to determine the importance of comorbidities for the death of hospitalised COVID 19 patients.

Methods: Retrospective cohort analytical study of comorbidities in COVID 19 patients hospitalised in the Clinic for Lung Diseases University Clinical Center Nis from March to September 2020.

Results: The study enrolled a total of 857 patients. It was found that men <40 years and 40-65 years without comorbidities were statistically significantly more ($p < 0.0001$) than women of the same age. There were statistically significantly more men aged 40-65 years without comorbidities ($p < 0.001$) compared to men of the same age with one comorbidity. There were statistically significantly more ($p < 0.001$) men >65 years with one comorbidity compared to women of the same age. The overall mortality rate was 10.26%. The mortality rate of patients without comorbidities was 3.73%, which is statistically significantly lower ($p < 0.001$) compared to the mortality rate of patients with comorbidities of 14.74%. Hypertension 32.60%, diabetes 16.66%, and cardiovascular diseases 16.66% were the most frequent comorbidities among the dead ones.

Conclusions: Cox's proportional regression model was applied to determine potential risk factors with a 95% confidence interval, and it was found that men and women aged >65 with more comorbidities have the highest risk of death compared to other COVID 19 patients without, and with one or more comorbidities.

Key words: COVID 19, comorbidities, mortality rate

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Exercise and Sports after COVID-19 – the Rehabilitation Perspective

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Background: COVID-10 infection is a global pandemic, affecting all segments of the population to varying degrees. Symptoms can range from mild symptoms lasting several days to serious clinical conditions, which can result in death. COVID-19 can be a multi-organ disease, which can cause long-term structural damage to various organ systems, including the lungs, heart, blood vessels, liver, kidneys and intestines.

Methods: A systematic search was conducted within the PubMed database searching studies that reported exercise recommendations, as well as recommendations for safe return to sports after COVID-19.

Results: Current exercise recommendations include standardized pre-exercise testing as well as an individually designed exercise program. Considering the systemic nature of COVID-19, an individualized concept of training both during the acute phase of the disease, the early phase of recovery, and afterwards is essential. Enabling a safe return to exercise after a COVID-19 is a major challenge for the medical team. Therefore, an individualized approach that begins with low-intensity exercises and gradually intensifies is the principle of rehabilitation of this group of patients. Patients wishing to engage in recreational sports or return to competitive sports after a COVID 19 infection must be considered separately and accurately.

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Drug induced liver injury associated with tocilizumab in patients with SARS CoV-2 infection. Case report

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Background: Tocilizumab (TCZ) is an antagonist of interleukin-6 (IL-6) receptors, used in the treatment of critical COVID-19 patients who developed cytokine release syndrome (CRS). Since the beginning of the pandemic of SARS CoV-2, clinical reports have shown the potential hepatotoxicity of the virus, however, cases of liver damage caused by TCZ have been reported.

Case presentation: A case report of a hospitalized patient with a severe form of COVID-19, who developed CRS and was treated by TCZ, antibiotics and other medication following the protocol, after which liver damage was registered the next day, in the form of a significantly increase level of serum transaminase (Aspartate aminotransferase: 1240 IU/L, Alanine aminotransferase: 1432 IU/L) with normal values of gamma-glutamyl transferase and alkaline phosphatase. On the admission the all liver test analysis were normal. Abdominal echotomography described normal findings of all parenchymal organs of the abdomen. Serology blood tests for hepatotropic viruses (HBV, HCV, HIV, CMV, EBV) were negative. Liver biopsy was not performed due to the severe form of the disease. One month after discharge, the patient had no gastrointestinal and hematological manifestations and all liver functional tests were in the normal ranges.

Conclusion: The use of TCZ in COVID-19 patients with a severe clinical form of infection has been shown to be effective in preventing further deterioration within CRS, however, its use carries a significant risk of liver damage, especially when combined with antibiotics and other potentially hepatotoxic medication.

Keywords: tocilizumab, SARS CoV-2, drug-induced hepatotoxicity, cytokine release syndrome.

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Heparin-Induced Thrombocytopenia In Patients With Severe COVID-19

- Case Report

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Introduction: COVID-19 caused by SARS-CoV-2 virus in severe cases leads to immune dysregulation with acute respiratory distress syndrome, multiorgan dysfunction, as well as thromboembolic complications due to activation of the coagulation system and endothelial damage. The incidence of heparin-induced thrombocytopenia (HIT) in critically ill patients with COVID-19 is 0.8-2.2%. The difference in the clinical picture between severe COVID-19 and HIT is a challenge.

We present a case of a 60-year-old male with severe COVID-19 who was on non-invasive ventilation due to massive bilateral pneumonia (CT severity score 15/25) and the development of HIT with arterial thrombosis of the upper extremities. In the further course of the disease, deep venous thrombosis of the lower extremities, pulmonary embolism and ischemic cerebral infarction were also verified. The diagnosis of HIT was confirmed by a 4T clinical scoring system and a positive anti-heparin-PF4 ELISA test, as well as a positive platelet aggregation test with heparin. Platelet count normalization occurs during fondaparinux therapy. Laboratory analyzes showed a moderate anemia syndrome, normal antithrombin III levels (99%), high neutrophil-to-lymphocyte ratio (12), elevated APTT (40.9s), protein C and S at the lower limit of reference values, without resistance to active protein C, positive lupus anticoagulant (LA) (1.6), elevated FVIII and hyperfibrinogenemia. Thromboelastography (TEG) indicated a hypercoagulable condition. On discharge, the patient was transferred to oral anticoagulant therapy with coumarin derivatives with acetylsalicylic acid.

Conclusion: HIT associated with COVID-19 is extremely rare and can be easily misdiagnosed given the nature of the disease. Although both COVID-19 and HIT are hypercoagulable disorders with a significant risk of thrombotic complications, treatment and course differ significantly. Studies have shown greater dominance of antiPF4/H antibodies in proinflammatory conditions associated with elevated IL-6 levels, which are found in severe COVID-19 forms. It is unclear whether and how COVID-19 increases the risk of developing HIT.

Key words: HIT, COVID-19, pulmonary embolism, coagulopathy

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Connection Between Vaccination Status And The Degree Of Inflammatory Changes Verified By Multidetector Computed Tomography Of The Chest With The Treatment Outcome In Patients With COVID-19

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Background: In December 2019, a new coronavirus disease broke out, which was declared a pandemic in March 2020. For the diagnosis and monitoring of the disease and the RT-PCR method, antigen and serological tests, an important role is played by multidetector computed tomography of the chest, whose value represents the percentage involvement of the lung parenchyma by inflammatory changes. Although there is no single effective drug against COVID-19, in addition to preventive, protective measures and therapeutic approaches, vaccination is a key to limiting the spread of the pandemic.

Methods: This research included 288 patients (165 male and 123 female) treated at the Dragiša Mišović Clinical Hospital from September 11, 2021, to October 8, 2021. By inspecting the medical documentation, for each patient, data on the CT score and vaccination status were recorded and the treatment outcome that we observed over 28 days. Statistical analysis was performed by Chi-squared test.

Results: A statistically significant difference ($p < 0.05$) in mortality was found between patients with mild inflammatory changes (CT score 0-7) compared to patients with moderate (CT score 8-17) and severe (CT score 18-25) inflammatory changes of the lung parenchyma. Also, a statistically significant difference ($p < 0.05$) in mortality was found between patients who were not vaccinated and patients who were vaccinated against COVID-19.

Conclusion: Multidetector computed tomography of the chest (CT score) is a significant predictor of the treatment outcome in patients with COVID-19, while vaccination reduces mortality from this disease.

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„Mission Impossible: Surviving Two Lethal Diseases Together – Acute Endocarditis with COVID“

Igor Rudez¹, Josip Varvodic¹

During the last two years, COVID-19 pandemic ruled the World. Unfortunately, people still are getting sick from other, also severe, diseases. Although the COVID-19 is still present, patients need treatment for other life-threatening conditions. We present the case of a 36-year-old patient with severe infective endocarditis with a large abscess of the aortic root, who also is COVID-19 positive. Precise diagnostics and treatment were not possible due to COVID-19 and organizational changes in the structure of the healthcare system. At the end, despite all obstacles, emergent surgery was indicated due to acute cardiac decompensation and the development of heart failure symptoms, and the patient recovered uneventfully after surgery.

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Treatment of Acute Surgical Disease and Conditions, in Moderate and Severe COVID-19 Within the Covid Hospital Zemun

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Background: The organization of the health system of our country during the aforementioned pandemic, required the engagement of all doctors, regardless of their specialty, in the treatment of patients with covid. Surgeons of all branches, from our institution, were directly engaged in the treatment of both primary manifestations of the virus and numerous surgical complications arising in the wake of this disease, but also primary acute surgical diseases in COVID patients. The aim of this paper is to present the work of our Surgery Clinic in the conditions of the pandemic, as well as to present the types and results of surgeries performed in patients with COVID infection.

Methods: This study is designed as a retrospective study of 232 patients who underwent emergency surgery after a previously verified COVID infection in the period from March 2020 to May 2021.

Results: Chest drainage due to development of pneumothorax accounted for a quarter of all interventions, while surgical treatment was undertaken in 53.85% of cases due to acute abdomen of various etiologies, or vascular diseases in 21.15% of cases.

Conclusion: In addition to partaking in the treatment of COVID infection itself, surgeons were engaged in a large number of cases in their primary activity in health care, that is, in the treatment of surgical diseases and complications of COVID, performing demanding surgical procedures in very difficult and unique conditions.

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Indications For Surgical Intervention of a Maxillofacial Surgeon in Covid Hospital Krusevac - a Review of Literature and Case Series Report

Predrag Kovacevic¹

Background: COVID-19 is a viral infection caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), with a large number of ill patients. The most severe clinical picture is characterized by the development of respiratory distress syndrome that requires endotracheal intubation. Tracheostomy is indicated in special circumstances.

Methods: A review of the literature and identified indications is presented, as well as methods of preventing contamination of the surgical team. The analyzed works define that tracheostomy is indicated predominantly by the duration of intubation from 20 to 28 days. It also states the planned separation from the ventilatory machine, the need to reduce sedation and achieve conditions for better respiratory hygiene.

Results: Consultation of a maxillofacial surgeon was required for 5 patients. Three tracheostomies were performed at the Covid Krusevac, all three females aged 59, 64 and 68 years, with an average intubation time of 22 days. All was performed in bed using sedation and local anesthesia. There were no surgical complications. Oxygen saturation has been improved. All died 2 to 7 days later.

Other indications were acute pulpitis (tooth extraction) without complication and non-dentogenic facial phlegmona (conservatively treated), but the patient died in ICU due to severe respiratory failure and cerebral infarction.

Conclusion: Indications for consultation with a maxillofacial surgeon at Covid Hospital are extremely rare. Performing a tracheostomy is challenging even for an experienced surgical team. Other emergency consultations are extremely rare.

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Diabetes at the COVID hospital "Zvezdara" University Medical Center

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Background: Coronaviral disease 2019 (COVID-19) severely affects elderly with health issues, such as cardiovascular disease, obesity and diabetes, necessitating hospitalization. "Zvezdara" University Medical Center in Belgrade, was completely transformed into a Covid hospital, 5 times during the pandemic.

Methods: Subjects with diabetes continued using their prior therapy. HbA1c was not assessed, only fingerstick glycemia. High glucose levels were treated with short acting insulin. Similar situation happened in the 2nd wave. Diabetes control was assessed through 4 mandatory daily glucose measurements. A minimum of care for diabetes was defined. This was done in the 3rd wave. Endocrinologists made simple instructions for all teams. This included HbA1c assessment and glycemic lists indicating prior therapy, daily glucose measurements and therapy change. Instructions were written to all teams how to properly define diabetes therapy in the hospital discharge document. Use of ketosteroids made diabetes control even more difficult in the 4th and 5th wave. Insulin was the main treatment choice.

Results: During that time there were 8594 hospitalized patients, of which 2112 had diabetes. In the first wave 1.4.-1.6.2020, there were 187 subjects with diabetes of the 907 hospitalized (20.6%). In the second wave, 25.6.-15.8.2020, 1147 were hospitalized, of which 239 had diabetes (20.8%), while in the third period (01.11.2020 -26.1.2021) 726 were diagnosed with diabetes of the 2877 hospitalized (25.2%). One quarter of the hospitalized subjects had diabetes during the 4th (12.3-12.5.2021) and 5th (19.9-27.11.2021) transformation into the Covid hospital; 393 of 1497 (26.3%) in forth and 567 of 2167 (26.1%) in fifth.

Conclusions: Our experience indicates that optimal management of patients with diabetes is warranted and should be included in further guidelines.

Key words: diabetes, guidelines, COVID-19

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Outcome of COVID-19 in Patients with Kidney Transplant-Our Experience with the Use of Monoclonal Antisars-CoV-2 Antibodies

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Background: The goal was to see the frequency and outcome of the COVID-19 within our kidney transplant patients, as well as the effect of tocilizumab and antiSARS-COV-2 antibodies (mAb).

Method: We analyzed 220 kidney transplant patients who were monitored at our center.

Results: 55 pts contracted COVID-19 (25%). The average age of the infected was 48,38 years old; 67% were male patients. All of the transplants were on triple immunosuppressive therapy. In 76% of patients during COVID-19 the antimetabolite was excluded. Because of poor clinical prognosis with radiographically proven pneumonia 18 (33%) pts have been hospitalized. Tocilizumab was used in 4 hospitalized patients (7%), of which three were fatal. AntiSARS-COV-2 mAb was used in 13 non-hospitalized patients (24%), no fatalities were reported. In 3 pts (5,5%) renal replacement therapy was applied, within the rest of the patients the worsening of the graft was not noticed. Out of all infected, death occurred in 8 pts (14,5%), that is, in 44% of the hospitalized. The death cause was severe acute respiratory syndrome (50%), cardiac arrest (25%) and multiorgan failure (25%). All the patients that have died have had serious comorbidities (congestive heart failure, diabetes mellitus, liver failure), or late admission to the transplant center.

Conclusions: The therapeutic use of mAb was reliable, with a significant positive effect on achieving a milder clinical form and shorter duration of the disease. The main risk factors of adverse outcome of COVID-19 in kidney transplant recipients were serious comorbidities and late admission in transplant centers.

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COVID-19 Course and Outcome in Patients with Inflammatory Bowel Disease on Biologics

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Background: Risk of COVID-19 does not seem to be increased in patients with inflammatory bowel disease (IBD) based on current reports. Current medications for IBD do not increase this risk; on the contrary, some of these might be used as therapeutics against COVID-19 and are under clinical trial.

Method: 330 patients with IBD from Tertiary Referral Center for inflammatory bowel disease in University Hospital Medical Center "Zvezdara", on biologic therapy anti-TNF α (Adalimumab-ADA, Infliximab-IFX, Golimumab-GOL) and anti-integrin therapy (Vedolizumab) were analyzed for Covid-19 incidence and severity from March 2020 to November 2021. Statistical analysis was carried out using SPSS 20.0 (Chicago, IL).

Results: From 330 patients, 61.2% (202/330) patients had CD, and 38.2% (128/330) had UC. From those patients 24 were excluded because biologic therapy was stopped. Gender distribution was relatively equal, 54.5% men (180/330), with an average age of 55.7 (SD \pm 15.1) years. On antiTNF α therapy ADA were 112 patients, on IFX were 98 patients, on GOL 4 patients and on VDZ 116 patients. 92 patients (30%) on anti-TNF α (67 patients) and anti-integrin therapy (25 patients) were affected by Sars-Cov2 virus. 72 patients (73%) had a mild or asymptomatic course of disease. 29 patients (31%) had concomitant therapy with immunomodulators (AZA/MTX). 20 patients (27%) had severe COVID-19 pneumonia and 18 patients (19%) were hospitalized. Two patients (2.1%) died from Covid-19; both patients had comorbidities.

Conclusions: Mild or asymptomatic COVID-19 course was noticed in the majority of our patients. Comorbidities significantly impact Covid-19 outcome in IBD patients.

Keywords: COVID-19, IBD, biologics.

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The Impact of COVID-19 Epidemic on the Treatment of Patients with Bladder Cancer

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Background: Timely diagnosis and treatment of patients with bladder cancer during the Covid 19 epidemic is a significant challenge given the variable nature of disease progression. The aim of the research is to compare clinical and pathoanatomical data after radical cystectomy, in patients with verified bladder cancer, analyzed through two time periods - before and during the epidemic.

Methods: The retrospective study included patients who underwent radical cystectomy due to bladder cancer in the period from January 1, 2018 to February 1, 2022 at the Clinic of Urology, University Clinical Center Nis. Patients were divided into two groups in relation to the time of the operation: group A (January 2018 - February 2020) and group B (March 2020 - January 2022).

Results: A total of 117 radical cystectomies were performed (group A - 53, group B - 64). The stage of the disease was \leq pT1 in 16 patients, pT2a in 8, pT2b in 13, pT3a in 23, pT3b in 25, pT4 in 32. Compared to the observed groups, the total number of patients with stage \geq pT2 was higher in group B, with a statistically significant difference in favor of group B when it comes to stage pT4 ($p < 0.05$).

Conclusions: The results of our study indicate that the period of Covid 19 epidemic was associated with an increased number of patients with bladder cancer at the stage of locally advanced disease.

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Report of three cases of Herpes zoster following COVID-19

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Background: Herpes zoster (HZ) is caused by the varicella-zoster virus, which reactivates and spreads from the dorsal root ganglia to its respective dermatome. Patients at risk of HZ include elders and immunocompromised hosts. Although COVID-19 is known to affect the immune system and may increase the risk of HZ, limited reports confirm an association between HZ and COVID-19.

Case report: Here, we present a report of three cases of HZ following COVID 19. First one is a boy 17 years old, who had HZ three weeks after COVID 19, PCR confirmed with mild symptoms.

Second one is a boy 8 years old, PCR for COVID 19 was performed because of infected parents. He had no symptoms of COVID 19. Two weeks after PCR positivity, the shingles appeared. Third one is a woman 41 years old, lesions of HZ appeared three weeks after COVID 19. She had mild pneumonia treated at home.

Conclusions: Herpes zoster is caused by reactivation of varicella-zoster virus (VZV) after the primary infection of varicella, and the reactivation may occur spontaneously or be induced by stress, fever, or immunosuppression. In these cases, the VZV reactivation might be associated with the lymphopenia caused by COVID-19. Cell-mediated immunity is influenced by T cells. HZ is reactivated when the host's cell-mediated immunity decreases, as seen in patients with immunodeficiency. However, COVID-19 also decreases cell-mediated immunity by decreasing lymphocyte count and CD3+, CD4+, and CD8+ T cells. 3 Therefore, COVID-19 could increase the risk of HZ by decreasing cell-mediated immunity.

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Clinical Features and Disease Course Of Cancer Patients On Chemotherapy With COVID-19 – Single Institution Experience

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Background: Cancer patients infected with SARS-CoV-2 represent a highly vulnerable population. We aimed this investigation to show clinical features and outcomes of the patients who had mild to moderate COVID-19.

Methods: The retrospective study included 25 cancer patients treated in CHC Zemun, during the period March – June 2020., confirmed with SARS-CoV-2 within seven days of their last anticancer treatment. Clinical data were collected from medical records and processed by methods of descriptive and inferential statistics.

Results: Patients' mean age was 68.1 ± 10.4 years. More than 2/3 of the patients were with ECOG PS 0 and 1, and about 4/5 of patients were in III or IV cancer stage. The most frequently applied types of therapy were radiotherapy and combined radio/chemotherapy. Eleven (44.0%) patients had bilateral pneumonia while 4 (16%) had unilateral pneumonia. The most frequent symptoms were fever (72%), fatigue (72%), dyspnea (32%), and cough (32%). 1/5 of the patients needed oxygen support. Mean neutrophil (2.6 ± 1.2), lymphocyte (0.9 ± 0.6) and platelets (200.1 ± 88.1) number significantly increased from admission to discharge ($p=0.004$, $p=0.005$, $p<0.001$). Median CRP significantly decreased from 40.4 (6.2-96.2) at admission to 11.35 (3.75-27.65) at discharge ($p=0.008$). Twenty-four patients were cured, and one patient died. Naso-pharyngeal SARS-CoV-2 clearance time was 19.4 ± 6.9 days; the minimum was seven, and the maximum was 39 days.

Conclusion: Cancer patients with SARS-CoV-2 during anticancer treatment can overcome COVID-19 without developing further respiratory or other complications during hospitalization. An increase in lymphocyte and neutrophil counts, with a decrease in CRP, may be markers of a favorable prognosis.

Keywords: SARS-CoV-2, COVID-19, cancer, chemotherapy, radiotherapy.

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Clinical Presentation and Management Approach to the Patients Suffering of Endocrinopathies other than Diabetes in COVID-19 Circumstances: The Experience From Zemun Clinical Hospital

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Background. COVID-19 is a clinical syndrome caused by different strains of SARS-CoV2. Severe and life threatening presentations of COVID-19 are often registered in patients with immune system deterioration. Endocrinopathies observed in COVID-19 patients can be pre-existing and newly diagnosed. The aim of this study is to present the clinical presentation and treatment approach of the COVID-19 hospitalized patients with pre-existing and newly diagnosed endocrinopathies other than diabetes.

Material and methods. This mini-review is based on the experience of attending clinicians who managed COVID-19 patients with associated endocrinopathies other than diabetes in Zemun Clinical Hospital during 2020-2021.

Results. The observational study is presented by two groups of COVID-19 patients: with pre-existing and newly diagnosed endocrinopathies other than diabetes. In the majority of COVID-19 patients with pre-existing endocrine system disorders, hypothyroidism, hyperthyroidism, and primary adrenal insufficiency was registered. Any detrimental influence of COVID-19 and used medication regarding stability of endocrine disorder treatment was not revealed. Newly diagnosed endocrinopathies with exception of diabetes are mostly registered either in young, previously healthy subjects (subacute thyroiditis) or in older subjects with co-morbidities and extensive therapy (SIAD and euthyroid sick syndrome).

Conclusion. The clinical course, diagnostic and treatment approach to patients with pre-existing and newly diagnosed endocrinopathies other than diabetes is consistent with current guidelines. In severe and life-threatening forms of COVID-19, euthyroid sick syndrome often predicted COVID-19 poor outcome.

Keywords: endocrine disorder, COVID-19, management.

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Clinical Presentation and Management Approach to Diabetes Patients in COVID-19 Circumstances: The Experience From Zemun Clinical Hospital

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Background. The COVID-19 epidemic continues to threaten humanity. Diabetes mellitus (DM) patients are recognized as the population more vulnerable to serious COVID-19. The aim of this study is to present the clinical presentation and treatment approach of the COVID-19 hospitalized patients with pre-existing and newly diagnosed DM.

Material and methods. Mini-review study is based on observations of experienced clinicians involved in management of COVID-19 patients with DM, treated in Zemun Clinical Hospital during 2020-2021.

Results. Study population consisted of two groups of patients: the first group involved the patients with pre-existing DM and the second group comprising the patients with newly diagnosed DM during COVID-19. In the first group, the inconsistent daily glycemic regulation was registered in patients who underwent corticosteroid treatment (CST) and among those experiencing diarrheal complaints. Newly diagnosed DM mostly followed older patients with co-morbidities and CST users. Clinical presentation and management approach was consistent to DM treatment guidelines, with an exception of metformin use. Concerning pathophysiology of serious COVID-19, it was temporarily excluded. No higher incidence of acute DM complications (hypoglycemia, diabetic ketoacidosis, lactic acidosis, and hyperosmolar coma) was observed.

Conclusion. Clinical course and management approach to DM patients in COVID-19 circumstances is not different than usual. Regarding newly diagnosed DM, the basic treatment is consisted of appropriate diet regimen and exercise, oral anti-hyperglycemic agents (sulfonylurea derivatives, DPP4i, SGLT2i) and insulin. In the pre-existing type 2 DM, metformin was temporarily omitted and its regular use was recommended after patient's recovery.

Key words: diabetes mellitus, COVID-19, management

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Challenges in the treatment of COVID-19 in Intensive Care Unit-Case Report

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Background: Since the beginning of the COVID-19 pandemic, the disease has shown a heterogeneous character. Due to the severity of the infection, comorbidity, radiological progression of X-rays of the lungs and the development of acute respiratory failure, a large number of hospitalized patients have been admitted to the Intensive Care Unit (ICU). Critically ill Covid-19 patients required intensive participation of both anesthesiologists and other specialists, but also intensive participation of nursing staff.

Methods: A 50-year-old man was admitted to the ICU from another health facility due to deteriorating general condition and radiological status. He was admitted to the hospital on the eighth day of his illness. He was vaccinated and from comorbidity states diabetes mellitus, hypertension, obesity. The therapeutic response to noninvasive ventilation support was inadequate. The patient was intubated the day after admission and placed in a prone position. Numerous complications developed during hospitalization, such as sepsis of pulmonary origin, sepsis associated with central venous catheter, ventilator associated pneumonia, ileus paralyticus, enterocolitis per *Cl.difficile*, urinary infection, polyneuropathie, ulcus decubitale, cellulitis. Percutaneous tracheostomy was performed on the 10th day after intubation. Antibiotic therapy has been corrected several times. Due to high fever and multidrug resistance antibiogram, Cancidas is empirically introduced into therapy. Partial nephrectomy was performed, and due to polyneuropathy, pain therapy was included Enteral and parenteral nutrition are included.

Results: After 2 months from the onset of MV, the patient was decannulated. Early rehabilitation treatment has begun. The markers of inflammation were in the reference range. An X-ray of the lungs was satisfactory. After 62 days the patient was discharged from the ICU.

Conclusion: The multidisciplinary approach applied in our hospital proved to be useful in treatment. This approach had the advantage of earlier identification of at-risk patients, prediction of their worsening, adequate observation of comorbidities. A multidisciplinary approach reduces the risk of potential complications during pronation, with anticoagulant prophylaxis, separation from mechanical lung ventilation, and other interventions in critically ill patients.

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Treatment of Severe COVID-19 Pneumonia - Tocilizumab vs Baricitinib, Our Experiences.

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Background: During Covid-19 pandemic, various treatment options were proposed worldwide. As vaccination has progressed, the situation around Covid-19 has entered a new phase, but the optimal therapeutic options for treating severe Covid-19 are still being explored. This study's aim was to determine whether there was a difference in therapeutic response and disease outcome in patients with severe Covid 19 treated with tocilizumab or baricitinib with standard corticosteroid therapy.

Methods: A retrospective analysis of data taken from the Medical History of 201 patients with severe Covid 19 who were treated with tocilizumab or baricitinib in the period from March to December 2021 at the Covid Hospital KBC "Zvezdara" in Belgrade. Demographic, clinical and laboratory data and treatment outcome of patients receiving either tocilizumab or baricitinib were statistically processed.

Results: The study group consisted of 201 patients, mean age 59.83. 37 women and 64 men were treated with tocilizumab. Baricitinib was given to 33 women and 67 men. Analysis of data for the entire study group observed in relation to the outcome of the disease showed that there is a highly statistically significant difference ($p < 0.01$) for the following parameters: age, lymphocytes, neutrophils and lactate dehydrogenase. In the group of patients treated with tocilizumab, the same analysis confirmed a significant difference for the following parameters: age, lymphocytes, neutrophils, LDH, and for baricitinib years of age, lymphocytes.

Conclusion: There was no significant difference in treatment outcome in the group of patients with severe Covid 19 who were treated with either tocilizumab or baricitinib.

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Number of miscarriages within the first 12 weeks of gestation at the Hospital for Gynecology and Obstetrics of the Clinical Hospital Center Zemun during the COVID-19 pandemic

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Background: The clinical symptoms of COVID-19 occur between the fourth and fifth day of SARS-CoV-2 exposure. Danger to the fetus and early pregnancy complications may be caused by fever and hypoxemia. Miscarriage is one of the most common complications of early pregnancy. Missed miscarriage is confirmed if ultrasound proves cessation of previously registered cardiac activity in the embryo/fetus, or absence of such activity in a pregnancy past 7 weeks, or if CRL is >5 mm. The aim is to demonstrate the increase in the number of miscarriages within the first 12 weeks of gestation during the COVID-19 pandemic, as compared to the same period in the two preceding years, at the Clinical Hospital Center Zemun.

Methods: The retrospective study was carried out during the months when CHC Zemun was functioning within its standard mode of operation. The number of missed miscarriages during these months in 2020 and 2021 was compared to the number of missed miscarriages for the same months in 2018 and 2019.

Results: At CHC Zemun, in 2020, 165 procedures were performed due to missed miscarriage, significantly more than in 2018 (77) and 2019 (116). In 2021, 250 procedures were performed, as compared to 2018 (125) and 2019 (146).

Conclusion: The number of missed miscarriages increased significantly during COVID-19, as compared to the two years preceding the pandemic. The patient age distribution during the pandemic, compared with the two preceding years, did not significantly change. Further studies on the effect of SARS-CoV-2 on early miscarriage are necessary.

Key words: missed miscarriage, first 12 weeks of gestation, SARS-CoV-2, COVID-19

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Post-Acute COVID-19 Syndrome Manifested as a Cerebral And Systemic Vasculitis

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Background: Cerebral and systemic vasculitis is one of the well-recognized complications related to Coronavirus Disease of 2019 (COVID-19) infection.

Case report: Our patient is a 69-year-old male who developed cerebral and systemic vasculitis six weeks after mild COVID-19, manifested as daily tension headaches, progressive cognitive impairment and mental state alterations. Brain MRI showed supratentorial micro-ischemic lesions, periventricular leukoencephalopathy, hygroma, and postcontrast enhancement of meninges and temporal arteries, and whole-body PET-scan demonstrated inflammation of the thoracic and abdominal aorta, both iliac and both femoral arteries, followed by 49-fold increased value of interleukin 6 (IL-6). Clinical and radiological presentations were suggestive for cerebral and systemic vasculitis. Two months after initiation of intensive immunosuppressive therapy - high doses of methylprednisolone with Prednisone taper, therapeutic plasma exchange and tocilizumab infusions, the patient completely recovered.

Conclusion: Post-acute COVID-19 syndrome can be presented as a cerebral and systemic vasculitis associated with progressive brain damage and multiorgan dysfunction. Accurate and timely established diagnosis is necessary for rapid initiation of immunosuppressive therapy.

Key words: post-acute COVID-19 syndrome, vasculitis, systemic, CNS

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Severe Metabolic Acidosis due to Empagliflozin Induced Diabetic Ketoacidosis in a Diabetic Patient With COVID-19: a Case Report

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Verica Stanković-Popović^{3,4}, Branislava Ivanovića⁴

Background: Diabetes is one of the most frequently detected comorbidities in patients infected with COVID-19. Empagliflozin is a sodium-glucose-co-transporter-2 (SGLT2) inhibitor, which reduces renal tubular glucose reabsorption, thereby decreasing blood glucose level without stimulating insulin release. However, recent data has shown that SGLT2 inhibitors carry the risk of inducing diabetic ketoacidosis under certain circumstances such as acute illness. Diabetic ketoacidosis is a rare life-threatening complication associated with the use of SGLT2 inhibitor that may be unnoticed, particularly in the pandemic setting, delaying its treatment.

Case report: We present a 57 year old male with a history of systemic arterial hypertension and type 2 diabetes mellitus (T2DM), who was brought to Covid hospital Batajnica with myalgia, fever and cough. Symptoms began 6 days prior to admission, the patient was in good general condition. At that time the patient was on ramipril 10mg, amlodipine 5mg, metformin 2x1000mg, NovoRapid FlexPen (35ij+25ij+25ij) and empagliflozin 25 mg.

On the second day of admission he complained of shortness of breath and was tachydyspnea. Arterial blood gas showed pH of 6.96, pCO₂ 3.23, pO₂ 6.82, glucose 12.9, lactate 1.9, HCO₃ 5.3, BE 21.5. Urinalysis was positive for glucose, protein and ketones. Nephrologist assumed that empagliflozin induced ketoacidosis. The patient was started on insulin and bicarbonate infusion. On day 4th, HCO₃ increased to 28.2, and pH was 7.4. He responded well to treatment with clinical and laboratory improvement. Subsequent laboratory data continued to show significant improvement with the closure of the anion gap. He was discharged on subcutaneous insulin injections.

Conclusion: Given the increased usage of this drug in the management of T2DM patients, we set out to emphasize the risk of ketoacidosis on SARS-CoV-2 infected patients using SGLT2 inhibitors.

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Development of Acute Cardiovascular Complications In COVID-19 - a Case Report

Dragana Zanfirović Đurđević¹, Nevena Dugalić¹, Marta Vučetić¹

Background: Using triple therapy is a standard in the treatment of patients with ACS and pneumonia in COVID-19. The response to this therapy is not satisfactory in all patients.

Case report: A 62-year-old female was hospitalized in Covid Hospital Kruševac in a septic condition with bilateral pneumonia, Ag+ on SARS-CoV2 with SpO2 70% on HF 60/100. Symptoms started 6 days before admission with fever, cough, malaise, difficulty breathing and suffocation. She denied the existence of chronic diseases.

On admission dyspnoeic, tachycardic, cyanotic, normotensive, febrile. Placed on NIV and placed in ICU.

Laboratory parameters at admission indicated elevated values of inflammatory markers, PCT, troponin, and D dimers. ACS NSTEMI was diagnosed. Triple therapy, beta blocker and statins were included. On echocardiography, LV preserved contractility without thrombotic masses in the heart cavities.

On the tenth day, atrial fibrillation registered on the control ECG was converted medically to sinus rhythm. During the entire hospital stay on triple therapy with regular antiXa controls that were in reference values. On the 25th day, a fluctuating thrombus mass in the LV with hypokinesis of the lateral wall was seen on the control echocardiographic examination. Doppler of the blood vessels of the legs showed thrombosis VSM right.

On the 34th day, the general condition worsened, she was intubated (MV), resulting in a lethal outcome the same day.

Conclusion: In the treatment of patients with COVID 19 infection, it is necessary to always think about the development of more severe cardiovascular complications, even though they do not have previous diseases.

Key words: Acute coronary syndrome, myocardial infarction, thrombosis

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CBC Zemun National Reference Laboratory for Muscle Biopsy: Myositis and COVID-19 Pandemic

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Background: Despite well-established typical features for “primary” idiopathic inflammatory myopathies (IIMs): dermatomyositis (DM), polymyositis (PM), inclusion body myositis (IBM), and idiopathic inflammatory myopathy (NSIIM), a spectrum that may overlap with them it is wide. “Overlap myositis” (overlap between IIMs and systemic connective tissue disease) and toxic myopathy (caused by steroids, statins, chloroquine/hydroxychloroquine, etc.) appear frequently. Herein we systematically describe the histological features of a consecutive biopsied 28 patients with clinical suspect myositis in our laboratory during 2020-2021.

Methods: Muscle samples were obtained via surgical open biopsy, frozen in isopentane cooled in liquid nitrogen, and stained histochemical and immunohistochemical by standard procedures. Immunohistochemistry was performed in Labvision autostainer with routine antibodies for myositis. (CD8, CD4, CD68, MHCI, C5-b9, p62, LC3, TDP-43). At the time of biopsy, all patients were Covid 19 negative. A group of 9 patients who developed myositis after the Covid 19 infection did not have a severe form of the infection.

Results: In the group of 19 patients who did not suffer from Covid 19 the incidence of IIMs was confirmed in 95% of patients and “overlap myositis” in 5% of patients. In the group of patients who suffered Covid 19, the distribution was different: IIMs were confirmed in 67% patients, “overlap myositis” in 22%, and 11% myotoxic myopathies. NSIIM was diagnosed only in the group of patients who suffered Covid 19.

Conclusions: Our study highlights the already described protracted course of this viral infection in some patients and the potential for delayed onset of NSIIM, “overlap myositis” and myotoxic myopathies.

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New Onset of Psoriasis Guttata Following Covid

Jovana Majstorović¹

Background: Guttate psoriasis is a form of acute psoriasis, presented with small, red, scaly lesions, appearing all over the body. It usually affects children and young adults, one or two weeks following usually streptococcal infection but also other respiratory infections.

Methods: We present a 33 years old female, otherwise healthy, who presented to our clinic two weeks after the COVID-19, with small erythematous, scaly lesions all over the body.

Results: Our patient had mild COVID-19 (Omicron variant), treated only with vitamin supplements. Fever was present only one day. Two weeks after the positive test she started having small red lesions only on her trunk mimicking Pityriasis Rosea. After initial treatment with emollients, she had extensive dissemination of lesions all over the body. She was treated with topical mometasone furoate for 2 weeks, and all the lesions started fading. On the check-up one month after the onset she was without lesions.

Conclusion: Psoriasis guttata has been described to follow COVID-19 in less than ten cases all over the world. It is believed that viral infection followed by the stress of self-isolation is the main responsible for this flare

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Heart Insufficiency in Light of COVID-19 - a Case Report

Nevenka Zivkovic¹

Background: Cardiovascular complications caused by SARS-Cov2-viral inflammation of the heart muscle is heart failure (HF) (11,5%)

Case report: The patient E.S aged 69yrs arrives for an outpatient examination due to a continuous cough over 3 months. Suspicion of Covid-19, short-term fever, PCR test negative, vaccinated Pfizer 3 doses. Treated by otorhinolaryngologists (secretolytics). It denies dyspnoea, angina, palpitations, weight loss, 5year of hypertension. Objectively easily dyspnoeic. Pulmonary: impaired respiratory noise, basal bilateral silent breathing, right 2/3 of the lungs, rare cracks. Cor: tachyarrhythmia by absolute type, tones quiet, systolic murmur 3/6 parasternally left, TA=160/100mmHg, Palpation of slightly enlarged liver, edema of the lower legs 1/3. ECG: Atrial fibrillation, HR=94/min, ST isoelectric, negative T in D1, aVL, V6, LBBB, QTc=484ms. Transthoracic echocardiography shows voluminous mitral valve, mobility type AA, MVA=5.74cm², mitral regurgitation 2+ towards dilated left atrium 5.5x4.5x5.17cm, signs of diastolic dysfunction, enlarged left ventricle (EDD=7.22/ESD=5.49cm), globally hypokinetic, decreased systolic function (EF=46.32%), enlarged right ventricle (3.15cm), TR 1+ SPDK=30mmHg, PV-protocured (PW=0.86m/s), VCI=1.25cm, TAPSE=22.8mm. Laboratory: reduced JGF grad Io (e-GFR=88ml/min). Started drug therapy: sacubitril/valsartan, beta blockers, spironolactone, SGLT2-i, rivaroxaban, Ic class antiarrhythmics, henlo loop diuretics, statins.

After one month, subjectively no problems, (NYHA I), TA=120/80mmHg ECG: SR, HR=69/min, LBBB, no ST dynamics, negative T anterolateral, laboratory: NT-Pro-BNP=1678pg/ml, FPG=5.2mmol/l, s-Creat=100µmol/l (e-GFR=66ml/min), urea=6.3mmol/L t-Hol=5.7mmol/L, LDL=3.31mmol/L, HDL=1.96mmol/L, TG=0.94mmol/L.

Conclusion: Upper respiratory tract infection in the Covid-19 pandemic, masked the HF picture as evidenced by echocardiographic and laboratory diagnostics. Early diagnosis and introduction of drug therapy prevents the progression of HF and stabilization of heart rhythm.

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Clinical Features of Patients with SARS-CoV-2 Infection and Chronic Lymphocytic Leukemia - Case Report

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Background: Malignant hemopathies are characterized by dysregulation of the immune system caused by either a disease itself or by the applied treatment. Unlike lymphopenia, which is specific for severe forms of COVID-19 in general population, lymphocyte count in patients with CLL is three times higher during the disease than the initial count. Lymphocytosis is explained as presence of endogenous steroids induced by intensive inflammatory reactions, and can be temporary or caused by other conditions. The findings suggest that COVID-19 may trigger HSV reactivation.

Case report: A 62-year old patient was referred to hematologist in August 2021 for diagnosing leukocytosis with lymphocytosis. In March 2021, the patient was positive to SARS-COV-2 and was diagnosed with bilateral bronchopneumonia. Comorbidities: arterial hypertension, steatosis. Objective finding: no lymphadenomegaly or organomegaly. At admittance at Hematology Clinic, University Clinical Center Niš in August 2021, the laboratory test results were as follows: Le 24,5x10⁹/L, ne 6.4x10⁹/L, ly 15X10⁹/L, hgb 133g/L, hct 0,405L/L, tro 138X10¹²/L, AST 115 U/L, ALT 144U/L, ldh 728U/L, ggt 264 U/L, CRP 43,9mg/L, ferritin 152,8ug/L. Coagulation status: Aptt 48 sec, pt 55%, fibr 5,30, inr 1.58, D-dimer 751. Cytogenetic results: 46,XY. IgG 6.51g/L, IgA 1.12g/L IgM 6.66g/L, anti PR3 1.8 U/ml. The result of protein immunoelectrophoresis test indicated the presence of paraprotein IGM kappa 12.8 %, CMV IgM was higher than 600 pos, IgG neg, EBV IgM higher than 200, EBV IgG 11,8, HSV1 IgM 81.89, HSV1 IgG 198,33. Results of abdomen MRI conducted in August 2021: anteroposterior diameter of liver 19cm, with focal lesion in S6, diameter 8mm. No lymphadenomegaly. Bone marrow biopsy indicated the presence of lymphoproliferative disease chronic lymphocytic leukemia CLL/ SLL. CD20+ CD79a+, BCL-2+/- CD5 +,CD23+ ,MUM1-, BCL6-, low proliferative values of Ki67 up to 2%. The patient did not report to hematologist until November 2021, when acute anterior wall infarction was confirmed, after which the patient was treated by primary PCI POBA LAD. In January 2022, the patient was subjected to surgical myocardial revascularization by one arterial graft.

Conclusion: Occurrence of lymphocytosis in patients with COVID-19 is very rare and unexpected, and it can point to infection, inflammatory conditions or malignancy. Despite the fact that the absolute monoclonal B lymphocyte count was, in most cases, lower than 5x10⁹/L, and that lymphocytosis was occasionally transitory during the reactivation of EBV, CMV and HSV1 virus, the diagnosis of chronic lymphoproliferative disease after COVID-19 was set up. Post COVID-19 complications were manifested by anterior wall myocardial infarction, the pathogenesis of which can be explained by vasculitis and hypercoagulability.

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Impact Of COVID-19 Pandemic on Diagnosis and Lung Cancer Treatment

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Background: Lung cancer is the most commonly diagnosed and the leading cause of death from malignancy. With the outbreak of COVID-19 pandemic, the diagnosis and lung cancer treatment have been an increasing challenge.

Methods: A retrospective analysis of clinical data of newly diagnosed lung cancer patients before the outbreak of COVID-19 pandemic, in the period Jan 2019-Mar 2020 and during the pandemic, Apr 2020 - Dec 2021, was performed. We analyzed clinical characteristics of patients treated in our center and the impact of performance status on the choice of treatments.

Results: We registered 1366 newly diagnosed lung cancer patients, 839 patients treated in our center. Male were 69%, female 31% of patients. Non-small cell carcinoma accounts for 74.4% of cases. The lowest number of newly diagnosed and treated patients registered in 2020, 31.7% and 22% less than in 2019 ($p < 0.001$). A dramatic drop of patients registered at the beginning of the pandemic, in the period Apr-Jun 2020. No differences observed in the number of patients diagnosed at an early stage of the disease. During COVID pandemic, we registered more patients diagnosed with poor performance status, $PS \geq 2$. In 2021, 17% of new patients were treated with palliative care alone. In order to reduce the risk of treatment complications, dose reductions and delays of therapies reported in almost a third of patients.

Conclusion: The COVID-19 pandemic significantly affected lung cancer treatment, requiring exceptional oncologist flexibility and numerous challenges for optimization of treatments.

Key words: COVID-19, lung cancer, lung cancer treatment.

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Appendicitis in COVID-19-Positive Patient in Postpartum Period: Differential Diagnosis Dilemma

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Sladjana Mihajlovic¹

Background: The clinical symptoms of appendicitis in puerperium are atypical and often overlap with other symptoms.

Case report: A 33-year patient, 8 days postpartum, was admitted due to high fever up to 38.7 °C, dry cough and data showing that she was in contact with coronavirus disease 2019 (COVID-19)-positive. She was examined, and laboratory and radiographic evaluations were done. After initial treatment she started recovering well, but on the next day due to deterioration of her condition she was urgently operated on and acute appendicitis was diagnosed. The coincidence of symptoms of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection and the symptoms of appendicitis, as well as impaired immune status in puerperium, make it difficult to detect appendicitis in a timely manner and open the question if acute viral infection such as SARS-CoV-2 can trigger an acute appendicitis.

Key words: Appendicitis; Puerperium; COVID-19

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COVID-19 in newborns - our perspective

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Background: Children appear to be less severely affected by severe acute respiratory syndrome 2 (SARS CoV-2) than adults. However, there is a paucity of data describing the effect of the virus on babies in the first 28 days of life.

Methods: In this observation study conducted we would like to describe clinical and laboratory characteristics of newborns treated from COVID-19 at the University Hospital Center Dr Dragiša Mišović - pediatric department from September 2021 to March 2022. Descriptive statistics are presented as frequencies, proportions, mean and standard deviations as appropriate.

Results: 70 neonates with SARS CoV-2 infection diagnosed during the observation period received inpatient care at our hospital. They were 16.1 days old at the time of admission with the youngest neonate who was one day old. The average age of the newborns at the time of admission was 16,1 days. 40 newborns were born vaginally, while the rest were born via cesarean section. A great majority of newborn (56) were exclusively breast-fed, while the rest were on combined or only on adapted milk formulas. Close household contacts were the most common way of transmission. Clinical signs at the time of presentation: hyperthermia, poor feeding and vomiting, coryza, lethargy, tachypnea. All newborns were introduced to antibiotics in the treatment in accordance with protocol. They were treated for 5/7 days.

Conclusion: Prevention of COVID-19 in neonatal period still remains very important due to increased risk of the newborns having a non competent immune system.

Key words: COVID-19, newborns, immune system

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Burnout among Physicians working in the Ambulatory Respiratory Care Unit during the COVID Pandemic

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Background: High levels of burnout are consistently reported among physicians. It is anticipated that the COVID pandemic will aggravate this problem.

Methods: At the Respiratory Outpatient Ambulatory Health Care Center “Novi Sad”, Serbia, nineteen full-time, permanently-employed female physicians were examined. Their mean age is 42.5±6.2 years, working at the Center for a mean of 6–9 months (minimum:< 3 months, maximum:>18 months). The Ethics Committee of the Ambulatory Health Care Center, Novi Sad approved the study.

Results: Based upon the responses of these physicians to the Copenhagen Burnout Inventory (CBI) (Kristensen et al. Work Stress 2005;19:192-207), the mean Personal Burnout (A) scores were 57.5±23.1, Work-related Burnout (B): 52.4± 17.2, Patient-related Burnout (C): 43.9±26.4. These scores were much higher compared to baseline mean scores for hospital physicians from Denmark (36.6, 39.8, 26.7, respectively, according to the cited CBI study). In multiple linear regression analysis, adjusting for age, Burnout (A), (B) and (C) were all significantly associated ($p<0.05$) with months of work in the Respiratory Outpatient Unit ($\beta=0.54, 0.50, 0.51$, respectively).

Conclusions: Working conditions in the Respiratory Outpatient Unit need to be studied in-depth, focusing on potentially modifiable stressors. This investigation is on-going, using the physician-specific Occupational Stressor Index. Urgent measures are needed to reduce the inordinately high burnout levels among these physicians who take clinical responsibility for patients with respiratory manifestations of possible COVID origin. This is vital since burnout increases the longer these physicians work in the Respiratory Outpatient Unit.

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Initial CT finding as a predicting factor for COVID-19 course in patients treated within hospital conditions – Clinical Hospital Center „Dr. Dragiša Mišović - Dedinje“

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Background: The aim of our study was to present a correlation between an initial CT finding and treatment course/outcome of the disease in hospitalized patients. The study encompasses the period from June to December 2020.

Methods: In this retrospective study, analyses were performed on the initial, native, low-dose thorax CT exam. The exam was done within the first 7 days of the disease, performed on 212 positive symptomatic patients who were admitted to the hospital. CT severity score was determined for each patient and then the disease course and outcome parameters were monitored. The parameters included hospitalization duration, need for oxygen support as well as the disease outcome.

Results: Depending on CSS value, all patients were divided into 5 groups. Most patients (38,68%) were in group 3 (CSS 11-15). With regard to CT pathologic findings, 62% of the patients had a combination of inflammatory changes (ground-glass, crazy paving and consolidation). Group 5 (CSS 21-25) had the highest mortality rate (50%). Patients that had only ground-glass type of changes on the initial CT finding had 0% mortality rate.

67% of all hospitalized patients needed some sort of oxygen supplementation; 24% of them were admitted to intensive care unit, where 62% of them died.

Conclusion: Our study points to significance of initial CT exam in COVID-19 course and outcome prediction, such as admission to ICU, intubation and lethal outcome as well as consequential perception of possible early therapeutic steps in treating COVID-19 patients.

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COVID-19 in a patient with liver cirrhosis

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Background: Coronavirus disease-2019 (COVID-19) was first reported in China, in December 2019, and has since progressed into a global pandemic. While comorbidities including hypertension, chronic lung and heart disease have been defined as risk factors for poor COVID-19 outcomes, the impact of underlying chronic liver disease remains undefined. In this case study, we present a COVID-19 patient with cirrhosis.

Case report: The patient was a 41-year-old woman who was an ex-alcoholic, abstinent for two months. Two weeks after she had been diagnosed with alcoholic liver cirrhosis complicated with hepatic encephalopathy, ascites and esophageal varices (MELD-Na of 22 and Child-Pugh class C), she was admitted our hospital with fever and confirmed COVID-19. Lab exams on admission showed elevated C-reactive protein (47,9 mg/l), total bilirubin (91,9 umol/L), aspartate-aminotransferase (AST-143 IU/l), gamma-glutamyl-transferase (GGT-482 IU/l) levels with coagulopathy (elevated D-dimer-35,2 mg/L, international normalized ratio-INR-1,8) and antithrombin III deficiency. Chest tomography revealed bilateral pneumonia. The patient developed the need for auxiliary oxygen without invasive mechanical ventilation and was treated with 6mg dexamethasone a day, heparin, human albumin infusion, fresh frozen plasma transfusion, Kybernin and broad-spectrum antibiotic therapy. Three weeks after COVID-19 development the patient was discharged without residual symptoms.

Conclusion: We reported a case of COVID-19 in patient with alcoholic liver cirrhosis, with favorable outcome, but further data are required to investigate the outcomes and best treatment strategies in patients with liver cirrhosis and COVID-19.

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Percentage of elderly people treated for COVID-19 - onset versus end of infection

Background: COVID 19 coronavirus is a new disease that poses a specific risk to the elderly. This pandemic can be suppressed if people take steps and protection measures, but also if they act in solidarity with each other and take steps to protect and take care of those who are most at risk. Elderly people are at special risk of the COVID-19 coronavirus, primarily due to weakened immune systems and chronic diseases, but also due to the availability of information. It is possible that this is due to changes in the immune system that occur with age, so the defense against infections and diseases is more difficult. Older people are also more likely to already have certain health problems that make it harder for them to fight the disease and recover. In addition, people of all ages, with or without disabilities, are at higher risk of developing a disease caused by the COVID-19 virus if they already have more serious chronic diseases such as heart, lung or kidney disease. Reducing exposure to the infection is especially important for people at increased risk of complications.

Methods: In this paper, we compared hospitalized elderly people in the first fifteen days of the first wave of coronavirus in relation to the last period of infection in the COVID system in our hospital, the last 15 days.

Results: It was determined that in the last wave, statistically significantly older patients were hospitalized ($T = -5.542$, $p < 0.001$). We came to the conclusion that the isolation measures affected a smaller number of sick and hospitalized elderly people in the first wave of coronavirus. The vaccine may not protect the elderly as well, but it can certainly protect them to some extent. Vaccination of healthy people reduces the ability of the virus to spread among people, cause infection and mutate, so the official recommendations are to vaccinate as many people as possible.

Conclusion: It is important to know that new genetic mutations of the SARS-CoV-2 virus continue to appear, and mutated viruses during the COVID-19 pandemic continue to circulate in human populations around the world. Perhaps this is the reason why the elderly were more ill and hospitalized in the last wave of the COVID virus.

Keywords: COVID-19, elderly patients

Asthma and COVID-19 in Children

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Background: It is well known that asthma patients are prone to viral respiratory infections which induce asthma exacerbations in children and adults as well. During Covid19 pandemic it was observed that patients with chronic diseases - COPD, diabetes, obesity, hypertension were prone to develop severe forms of COVID-19. Meta analysis from 150 studies, revealed huge diversity in the prevalence rate of asthma: in the USA 11% prevalence, Mexico 2,9%, Europe 7,6%, China 1,9%. Studies on hospitalized patients with asthma and COVID-19s showed the tendency for patients with asthma to have mild clinical course, shorter duration of hospitalization and less mortality score 0,80 (CI 0,65-0,97), $P=0,02$, and significantly patients with asthma tend to be younger and more obese 1,98 (9,1-2.55), $p<0,001$.

Methods: Children Hospital for Pulmonary Diseases and TBC MC Dr Dragisa Miso-vic became the national center for COVID19 in children on March 16th 2020. From March 23rd 2020. until February 15th 2022., 1523 children were hospitalized due to infection with virus SARS COV 2. The aim of this investigation was to find out the most frequent comorbidities associated with COVID 19, mainly allergic conditions and asthma.

Results: Our analyses detected 4.5% of hospitalized COVID19 children having Asthma. Main symptom was a dry cough in 58,8% of children. Very few patients presented with wheezing and asthma exacerbation. Consolidation on X ray was present in 60% of cases.

Conclusion: Our most significant finding was detection of the prevalence rate of children hospitalized due to COVID 19 with asthma, and we found 4,5% of such cases.

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Non-critically ill COVID patient with encephalopathy: A case report

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Background: The spectrum of the clinical features of COVID-19 is exceptionally wide with symptoms of the disease reported in all organ systems. Encephalopathy and altered consciousness ranging from confusion, delirium to deep coma have been reported in up to 19.6% of those hospitalized due to COVID-19. Most of these patients were older and/or had a severe form of the disease. Herein, we report a case of a middle aged, otherwise healthy, COVID-19 patient with encephalopathy.

Case report: The patient was admitted on the 26th of September to the Clinic for Infectious and Tropical Diseases. On admission the patient's temperature was elevated, his breathing was not labored, his peripheral oxygen saturation was slightly decreased, he was hemodynamically stable but unresponsive to stimuli including pain. A head CT was normal, laboratory and ABG analysis revealed elevated concentrations of serum inflammatory markers without any signs of metabolic disturbances. No signs of a pulmonary embolism were found on pulmonary angiography, while only small foci of GGO were observed bilaterally. A spinal tap was performed and a laboratory analysis of the CSF was normal. The patient was admitted to the ICU. In the following days the patient was treated in accordance with the national COVID-19 protocol. The patient gradually regained consciousness during the first three days of the hospitalization and was completely recovered and discharged on day 13.

Conclusion: Our report highlights that severe neurological manifestations of COVID-19 can be seen in non-critically ill patients and that further research is needed to understand pathophysiological mechanisms of COVID-induced encephalopathy.

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ORL Symptoms In Hospitalized Patients with COVID-19

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Background: Pharyngodynia, nasal congestion, rhinorrhea and headache have been reported frequently in pts with COVID-19, as well as loss of smell (anosmia), altered function (dysgeusia) or loss of taste (ageusia). Anosmia can occur as an early and/or only Covid symptom. Tinnitus, instability, vertigo and disorder of acoustic function occur rarely. The aim of this study was to analyze the presence of ORL symptoms in moderate to severe Covid 19 pneumonia patients.

Methods: Study analyzed medical data in 230 hospitalized moderate to severe pneumonia patients with previously confirmed (either positive PCR and/or Ag test) SARS COV 2 virus infection hospitalized in Covid ZUMC, Belgrade. ORL symptoms as well as generalized Covid 19 related symptoms were analyzed from medical records. Results. Out of 230 analyzed patients mean age was 64 years, most common general symptoms were cough (72%), fever (52%), dyspnea (46%), malaise (46%), myalgia (19%), vomitus (3%) and diarrhea (3%). ORL symptoms distribution: throat pain 20%, anosmia 22%, ageusia 19%, headache 16%, tinnitus 6%, vertigo 5%, hearing loss 3%. Comorbidities were present frequently in older than 50 yrs. Hypertension was leading chronic disease in 60%, diabetes in 23%, COPD in 7%, malignancy in 7%, hypothyroidism in 6%, and renal disease in 4% of patients.

Conclusions: ORL conditions that should be subject for further survey are prolonged anosmia, ageusia or hypogeusia, auditory dysfunction and vertiginous complaints. Symptoms such as anosmia and dysgeusia can be proposed as important symptoms for Covid 19 screening procedures.

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Spontaneous Pneumothorax, Pneumomediastinum and Subcutaneous Emphysema in non-intubated Patients with COVID-19 Pneumonia

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Background: Spontaneous pneumothorax (SPT), pneumomediastinum (SPM) and subcutaneous emphysema (SSE) are spontaneous accumulations of air in the pleural cavity, mediastinum and subcutaneous tissue. Their occurrence has been observed in patients with COVID-19 pneumonia.

Method: An observational study was conducted in patients with SPT, SPM and/or SSE in whom no invasive mechanical ventilation (IMV) was applied in the Intensive Care Unit of Covid Hospital Zvezdara for a period of two months. Patients with a positive real-time reverse transcription polymerase chain reaction for SARS-CoV-2 and radiographically diagnosed bilateral pneumonia were included. Of the 105 patients, eight developed SPT, SPM and/or SSE confirmed and monitored by chest radiographs and multislice computed tomography. Comorbidities, vital parameters and laboratory parameters were examined in patients with SPT, SPM and/or SSE.

Results: Of the comorbidities, five had high blood pressure, one had type 2 diabetes mellitus, and two had no comorbidities. Four were smokers. One patient had SSE, one developed SPM, one developed unilateral partial SPT, three had unilateral complete SPT, one patient developed SSE, SPM, and bilateral partial SPT at the same time, and one described massive bullous changes bilaterally. Six patients later requested IMV and all six died. Two patients were discharged from the ICU, and then from the hospital for home treatment.

Conclusion: SPE, SPM and SPT are severe complications of pneumonia caused by SARS CoV-2, which are a poor predictive factor for the further course of the disease and increase the risk of death.

Key words: spontaneous emphysema, spontaneous pneumothorax, spontaneous pneumomediastinum, COVID-19

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COVID-19 Gastrointestinal Manifestations in Patients Treated In Clinical Hospital Center Zemun

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Background: COVID-19 gastrointestinal (GI) manifestations have been the subject of extensive research since the beginning of the pandemic. The GI system is considered as one of the target organs in COVID-19. Gastrointestinal bleeding is less common but presented more seriously. The role of endoscopy in the COVID-19 environment is still being analyzed.

Methods: Retrospective study analyzed the data obtained from medical records of patients with COVID-19 treated at the Clinical Hospital Center Zemun during 2020-2021. Regarding upper endoscopy, the indications for endoscopy, findings and other clinical data were analyzed.

Results: Out of 8013 patients, 48 (0.6%) underwent endoscopy. The average age of study population was 70 years, 58.3% men and 41.7% women. The most common indications for endoscopy were melena (64.6%), hematemesis (12.5%), hematochezia (10.4%), and microcytic anemia (12.5%). Concerning the upper endoscopy findings, normal finding, gastric erosions, gastric ulcers, duodenal erosions as well as ulcers were found in 39.6%, 35.5%, 8.3%, 8.3% and 8.3%, respectively. D-dimer was elevated in 77.3% and ferritin in 76.5% patients. The corticosteroids were applied in 56.5% subjects, while 23.4% received mechanical ventilation. Overall, fatal outcomes were recorded in 43.7% while 56.3% patients recovered.

Conclusions: The results of this study support the hypothesis that GI manifestations in COVID-19 are not directly linked with the virus. Natural history of prolonged and serious COVID-19 dramatically influences the presence of GI. According to precise indications, a relatively small number of patients received upper endoscopy. Further endoscopy guidelines must involve the instructions for procedures in COVID-19 settings.

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Corona-Like Massive Pneumonia Differential Diagnostic Challenges-Case Report

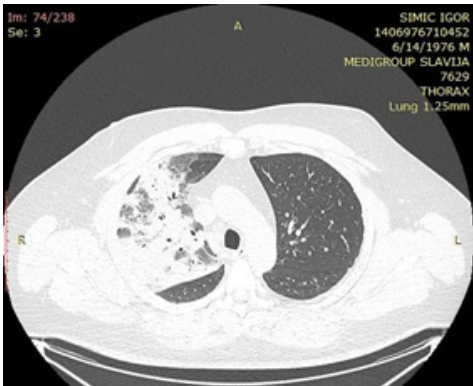
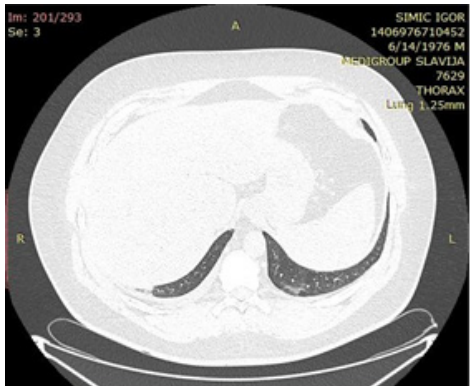
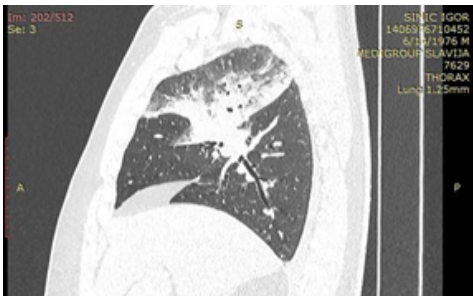
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Background: Since February 2020, more than 423 million cases and 5.88 million deaths are registered in the still ongoing global pandemic of SARS-CoV-2 virus, declared by the WHO on 11 March 2020. Differential diagnostic decisions took place-to treat the patient as covid or non-covid?

Case report: 45 y.o. male, presenting during pandemic outbreak in Serbia with severe respiratory distress symptoms, fever, dyspnea, fatigue, hypoxia, dehydrated, sweating. Chest x-ray shows triangle shadow sizing 10x5cm in right upper lung segment, SE 110, CRP 243.90, d dimer 1.0, iron 4.2, ferritin 996, IL 6 33.60, two antigen covid test negative, SARS-COV-2 PCR negative, Covid 19 -sars- IgM,IgG antibodies not detected. Personal history-psoriasis, obesity, HTA.CT chest scan showed massive pneumonia in the right upper lung segment, small zones of consolidation in right medial and lower segment with effusion. In the left lower segment are seen a few small "ground glass"- like findings. After these procedures the decision of non-covid pneumonia has been made. Polygraphy confirmed OSA (AHI 45). 10 days treatment by dual antibiotics (Vancomycin, Meropenem), by which the patient very quickly develops improvement in clinical, radiological and lab findings. On discharge sleep polygraph has been conducted when he was graded as moderate to severe sleep apnea which is suitable for CPAP usage during sleep.

Conclusions: Extreme significance of differentiating between covid and non-covid pneumonia, when patient presents with covid infection symptoms in pandemic outbreak. CIPAP, treatment OSA improves faster recovery. Confirming diagnosis and choosing appropriate treatment modality are of enormous importance since covid treatment protocol is crucially different among others regarding antivirals, corticosteroids and anticoagulants.

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Significance Of T1 And T2 Mapping in Evaluation Of Myocardial Tissue In COVID-19

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Background: In addition to infecting a respiratory system, COVID-19 causes acute myocardial injuries, as well as chronic damage to the cardiovascular system. Cardiac magnetic resonance (CMR) has proven to be an excellent and effective diagnostic method that can assess and quantify cardiac damage after COVID-19. The aim of this study was to evaluate myocardial damage using CMR in patients after COVID infection for further clinical approach and treatment.

Methods. The study was conducted in the University Clinical Center of Serbia and included 126 patients, 61 (48%) males, mean age 45±15 years. All patients underwent clinical work up, lab analysis, ultrasound, and CMR. CMR was done using standard protocol for morphological and functional assessment, late gadolinium enhancement (LGE), T1 and T2 mapping using MOLLI sequence, before and after contrast media application.

Results. The average time to CMR was 107 days. Pathological T1 post-contrast mapping was found in 59/126 (47%) patients with significant correlation between it and LGE ($r=0.415$). Loss of smell and taste were associated with T1 mapping and ECV, while palpitation and chest pain with T2 mapping. Fibrosis seen in echo has a negative correlation with values of T1 post contrast mapping ($r=-0.22$, $p<0.05$). Increased values of ECV were associated with D-dimer ($r=0.421$) and with reduced EDV and SV, absolute and indexed by BSA of both ventricles ($p<0.01$; $p<0.05$, respectively).

Conclusion: Using advanced CMR sequences it's possible to see myocardial damage regardless of contrast application. CMR is an important non-invasive diagnostic procedure that is providing useful information for the assessment and further treatment of those patients.

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COVID-19 in a Patient With Primary Hemochromatosis

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Background: Iron overload cardiomyopathy has been defined as the presence of systolic or diastolic cardiac dysfunction secondary to increased deposition of iron in the heart independent of other concomitant processes. Cardiac magnetic resonance (CMR) is a gold standard for the evaluation of myocardial tissue and a noninvasive method with the potential to assess quantitatively myocardial iron load. The aim of this presentation is to show myocardial damage seen on CMR in a patient with hemochromatosis and COVID-19.

Methods. A 29-year-old female patient diagnosed with hemochromatosis 14 years ago, had Covid infection 2-months before CMR was done. She complained for fever, sneezing, and dyspnea with a positive antigen test for COVID-19. During hospitalisation, CT excluded pulmonary embolism, while CT severity score of lungs was 1/25. Troponin, BNP, ferritin, iron, and transaminases were very elevated. Shortly she had oxygen support in therapy. After discharge from hospital, she continued to be fatigued, and CMR was indicated.

Results. CMR was performed using standard protocol for morphological and functional assessment, late gadolinium enhancement (LGE), T1 Mapping using MOLLI sequence, before and after contrast application, and T2* mapping for estimating iron in the myocardium. CMR revealed a reduced ejection fraction of the left ventricle with a high degree of myocardial hemochromatosis ($T2^* < 6\text{ms}$). Subepicardial zones of LGE in the mid-lateral left ventricular wall were found as sequelae of COVID-19 inflammation in the already changed myocardium.

Conclusion: Myocardial damage can be only seen in CMR as an important non-invasive diagnostic procedure, providing useful information for further treatment and prognosis of this patient.

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Pregnant Women with Mild to Moderate COVID-19: A Case Series

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Background: Pregnant women with COVID-19 are a vulnerable group because of multifactorial genesis that includes physiological anatomic changes, hormonal imbalance and alterations in immune systems. Clinical presentation varies in pregnancy, from asymptomatic cases to mild, moderate, severe and critical forms. The most common symptoms are cough, fever, dyspnea, malaise and myalgia. Laboratory findings usually indicate elevated C-reactive protein and interleukin-6, lymphopenia and hypoalbuminemia.

Methods: A case series was conducted in the Clinic for Infectious and Tropical Diseases, University Clinical Center of Serbia, from August 2021 to January 2022. Twenty seven pregnant women with confirmed SARS-CoV-2 infection were included. Medical records were retrieved and biochemical analysis was done.

Results: The median age of patients was 32.5 years, with median gestational age of 25 weeks. The average duration of symptoms at admission was 7.15, and length of hospital stay was 10.15 days. Only 4 (14.81%) pregnant women were vaccinated. The most common symptoms were fever (100%), cough (96.29%), dyspnea (48.13%), malaise (40.74%) and nausea (29.62%). In 20 (74%) pregnant women pneumonia were detected by auscultation of the lungs. C-reactive protein was elevated in all patients, fibrinogen in 21 (77.77%), and interleukin-6 in 19 (70.37%). Hypoalbuminemia was detected in all patients, lymphopenia in 19 (70.37%). All patients received anticoagulant and antibiotic therapy, while 4 (14.81%) required oxygen support.

Conclusion: Considering that pregnant women are at significantly higher risk for severe outcomes compared with nonpregnant women, preventive measures can prevent the transmission of COVID-19, and, therefore COVID-19 complications. The vaccination is certainly of the most importance.

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Comprehensive HLA Analysis in Patients with COVID-19-Induced Large Vessel Giant Cell Arteritis

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Background: Giant cell arteritis (GCA) is an immune-mediated vasculitis affecting large arteries, and hypothetically, may be triggered by viruses. Human leukocyte antigens' (HLA)-DRB1*04 and HLADRB1*01 were considered as susceptibility, while HLA-DRB1*15 and HLA-DRB1*16 as protective alleles for GCA. We analysed HLA in two cases of large vessel (LV)-GCA which developed after COVID-19.

Case presentation: The first case, a 69-year-old male, had a mild COVID-19 three months before presenting with features of LV-GCA and increased inflammatory parameters (CRP 2847mg/dl, IL-6 802.3pg/ml). MDCT arteriography performed on two occasions, a few months apart, revealed migratory arteritis. HLA typing showed: HLA-A*2,-A*24;-B*51,-B*57;-DRB1*15,-DRB1*16;-DQB1*05,-DQB1*06; The second case, a 64-year-old female, also developed LV-GCA two months after a mild COVID-19, presenting with a high CRP (183mg/dl) and constitutional symptoms. Thickening of the ascending aorta and the aortic arch was noticed on MDCTA. Typing of HLA revealed: HLA-A*2,-A*11;-B*27,-B*35;-DRB1*14,-DRB1*15;-DQB1*05,-DQB1*06; A whole-body 18F-FDG-PET/CT in both cases revealed inflammation of the ascending, aortic arch, thoracic and abdominal aorta. Corticosteroids were given in both cases; due to a prolonged inflammatory state, the first patient received tocilizumab, leading to a significant improvement.

Conclusion: LV-GCA may be considered as an autoimmune manifestation triggered by SARS-CoV-2 infection, and may represent the clinical presentation of the post acute COVID-19. Notably, none of the HLA susceptibility alleles for GCA were detected in our patients. In contrast, both patients were HLA-DRB1*15, and one of them HLA-DRB1*15/DRB1*16 carriers, suggesting a possibility of losing their protective effect in LV-GCA triggered by SARS-CoV-2.

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Prognostic Factors For Mortality in Patients With COVID-19

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Background: The goal of this retrospective study was to investigate the influence of various parameters on the risk of fatal outcome in patients with Covid 19 infection.

Methods: The study conducted a regression SPSS analysis of parameters: sex, CRP, d-dimer, ferritin, comorbidities, vaccine status at random 50 survivor and 50 fatal outcomes at patients hospitalized May - Dec 2021 in ZUMC Covid Dept, Belgrade.

Results: Hypertension risk 4.1% /women 10.5%// OR = 1,224 CI 95% 0.519 - 2,888 RD = 4.1% CI 0.743 - 1.202 /, chronic renal failure 20% /men 30%// OR = 7.610 CI 95% 1.622 - 35.708 RD = 20.1% CI 95% 0.39 - 0.700 /, malignancy 5.1% /men 11.1%// OR = 1.958 CI 95% 0.463 - 8.291 RD = 5.1% CI 95% 0.143 - 2.045 /, chronic heart failure 12.9% / OR = 1,811 CI 95% 0.785 - 4,178 RD = 12.9% CI 95% 0.376 - 1,188 /. Unvaccinated 14.5% /women 24%/ / OR = 0.539 CI 95% 0.242 - 1,200 RD = 14.5% CI 0.891 - 2.397 /, D dimer 32% /women 48%/ OR = 4.875 CI 1.932 - 12.301 RD = 32.1% CI 0.166 - 0.664 /, CRP 18.7% /males 27.4%/ OR = 2.167 CI 0.981 - 4.786 RD = 18.7% CI 0.510 - 1.016/, diabetes, obesity, gender, ferritin were not significant risk factors.

Conclusion: Chronic renal and heart failure, vaccine status, D dimer and CRP respectively were best mortality predictors in Covid 19 hospitalized patients.

Key words: prognostic factors, mortality, Covid 19.

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Concomitant Arterial and Venous Thrombosis and COVID-19: a Case Report

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Background: COVID-19 is associated with high risk of thrombosis. Potential mechanisms include endothelial damage, hypercoagulability, oxidative stress, dysregulated immune response and massive release of proinflammatory cytokines.

Case report: An 81-year-old female presented with dysarthria and left arm weakness and pain. She had a history of stroke and recently underwent left hip surgery. Physical examination revealed immobile, cold and pulseless left arm. Head and neck computerized tomography (CT) with angiography including aortic arch showed sequelae of previous stroke and subclavian artery thrombosis, but also revealed thrombus in the pulmonary artery branches. The extended examination confirmed the intermediate-risk pulmonary embolism. Laboratory analyses suggested systemic inflammatory response, with negative SARS-CoV-2 rapid antigen test. Electrocardiogram showed sinus rhythm and transthoracic echocardiography excluded intracardiac shunts and thrombosis. Due to acute limb ischaemia, she underwent emergent transbrachial thrombectomy, followed by anticoagulant treatment. Considering concomitant arterial and venous thrombosis, there was a high suspicion of SARS-CoV-2 infection. RT-PCR for SARS-CoV-2 was positive and she was transferred to the Batajnica COVID hospital. Because of progressive need for oxygen support, despite standard treatment for COVID-19, CT scan was repeated seven days after initial admission and showed bilateral pneumonia (CTSS-10/25). Contrary to doctors' advice, she left the hospital before completing the investigations and treatment.

Conclusions: Subclavian artery thrombosis is a rare cause of upper limb ischemia, usually caused by cardiac embolisation. Since no cardiac causes were identified, it may be a possible first sign of COVID-19. Although pulmonary embolism may be the consequence of deep vein thrombosis following hip surgery, COVID-19 represents an additional risk factor.

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Importance of Chest CT at the Beginning of COVID-19 Pandemic

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Background Chest CT has taken an important place in the beginning of the pandemic, during the lack of laboratory tests, because of its high sensitivity in detection of lung changes, evaluation of disease severity and prognosis. We aimed to show characteristic CT manifestations of COVID-19 suspected patients, their distribution, frequency and the role of CT as an additional diagnostic tool.

Methods This retrospective study included 87 patients (mean age 58,41±16,27) with signs of SARS-CoV-2 infection that underwent chest CT in University clinical center Nis, from March until November 2020. Patients were divided into two groups: with PCR confirmed infection (37 patients) and with suspected SARS-CoV-2 infection (50 patients). Specific changes were analyzed and compared in SPSS version 23.0.

Results Comparison of frequencies of CT changes showed that only pleural effusion was statistically more common in patients suspected for SARS-CoV-2 infection than in PCR confirmed patients ($p<0,05$). Neither the most common changes like ground glass opacities (87,4%), consolidations (74,7%), reticular pattern (78,2%) and crazy-paving (58,6%) nor subpleural lines, mediastinal lymphadenopathy, semiquantitative CT score and CT appearance according to RSNA showed statistical difference between two groups. Panlobar involvement was noted in most of the patients.

Conclusion Chest CT, as a diagnostic tool for detection of changes that can follow SARS-CoV-2 infection, alongside PCR testing as the gold standard, can be a reliable additional diagnostic method for this infection, with critical appraisal of clinical picture, laboratory results and current epidemiological situation.

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First Experience of Bamlanivimab for COVID-19 Positive Hemodialysis Patients: a Case-Control Study

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Background: To our knowledge, this is the first study to use bamlanivimab in COVID-19 + HD patients with the aim to determine the effect of bamlanivimab on mortality of these patients.

Methods: We conducted a retrospective case-control study across a single HD centre of non-hospitalized HD patients, with documented positive SARS-CoV-2 testing. Cases were defined as HD patients who received bamlanivimab and controls were patients who did not receive bamlanivimab.

Results: Patients who received bamlanivimab had more chronic obstructive pulmonary disease (COPD) than those in the control group. There were no significant differences between groups in any of the other parameters assessed. Besides higher baseline ferritin levels in the control group, no other significant differences in biochemical markers were found between examined groups. Over a one month follow up, one patient (7.7%) died in the bamlanivimab group, while 8 patients (44.4%) died in the control group. Multinomial logistic regression revealed that not bamlanivimab treatment, CAD and disease severity increased the risks of mortality 39.1 times ($p=0.12$), 81.7 times ($p=0.08$), and 99.9 times ($p=0.04$), respectively.

Conclusion: In COVID 19 positive HD patients, bamlanivimab has been a safe and effective treatment method, lowering mortality although not statistically significant. We also discovered that having a more severe clinical presentation at baseline, as well as having a CAD, was related with a greater risk of mortality. Our findings imply that larger, more conclusive clinical studies of bamlanivimab in HD patients with COVID 19 should be conducted.

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Psychiatric interventions in acute and post-acute hospitalized COVID-19 patients, review of acute delirium - Case study

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COVID-19 is an infectious disease caused by the RNA SARS CoV-2 virus. The virus was discovered in China around the middle of winter at the end of 2019. It made a huge impact on the world's health care system because of the ease of transmission, a high number of severe cases that need oxygen supplementation, and its fatal complications. Covid-19 is primarily an acute respiratory infection, but it can affect other organ systems and the brain. It has been a theory that the main cause of acute delirium and psychiatric complications in COVID-19 is caused by hypoxia, fever, dehydration, massive inflammation, cardiovascular complications, organ failure, social distance, separation from loved ones, stress, but some studies indicate direct SARS CoV-2 impact on the brain. This review will try to summarize the latest findings on neuro pathophysiological effects of SARS COV-2 infection and link them with psychiatric complications of covid infection. We want a better understanding of these mechanisms so we can diagnose, treat psychiatric complications of SARS COV-2, avoid drug interactions and give a better prognosis for COVID-19 patients with psychiatric complications.

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Impact Of COVID-19 on Child Health Services in Primary Health Care Centers in Republic Of Serbia During 2020.

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Background: During the previous ten years (2010-2020), the health policy of the Republic of Serbia among other priorities had a focus on preventive and curative medical care especially for preschool children.

SARS-CoV-2 pandemic has influenced all health services including medical examinations of preschool children. This study aimed to analyze coverage of the preschool children of Serbia, with preventive and curative medical examinations in the Primary health care centers (PHCC) from 2010 to 2020.

Methods: We used data for the period 2010 to 2020 as published in Health Statistics Yearbook of Serbia, which in a systematic manner presents basic data on population, morbidity, use of health services, as well as the impact of environmental factors on health.

Results: Data from the last ten years (2010-2020) shows that preventive examinations of preschool children in Serbia were not much influenced by Covid 19. All children had at least one preventive service each year. Most impact was on curative medical examinations, where we can notice a decline. In previous years, the number of services per child was about eight, while in 2020 there is a decrease to five. When we analyze the work of chosen doctors, we also see a decrease in the number of curative services from average 25 during the previous ten years to 16 in 2020.

Conclusions: Difficulties related to the availability and accessibility of primary health care caused by the COVID 19 pandemic, have undermined the coverage of preschool children with curative medical examinations.

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Successful Treatment of Spontaneous Rupture of the Spleen By Embolization of the Splenic Artery in a Patient With Acute Promyelocytic Leukemia and COVID-19

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Background: Spontaneous rupture of the spleen (SRS) is an extremely rare complication in acute promyelocytic leukemia (APL). We present the first case of APL and SRS successfully treated by transcatheter arterial embolization (TAE) of the splenic artery in a patient with COVID-19.

Case report: A 28-year-old female patient with febrile episodes and spontaneous hematomas was hospitalized in a non-covid hematological clinic. The initial blood count and laboratory evaluation showed anemia, severe thrombocytopenia, leukocytosis, pronounced disseminated intravascular coagulopathy (DIC) and the presence of the PML-RAR- α fusion gene. As the diagnosis of APL was established, PETHEMA 2012 protocol was initiated for the first 2 days. Due to the appearance of left-sided pneumonia, the patient was re-tested for SARS-CoV-2 virus and since the result was positive, she was transferred to our COVID Department of Hematology. Treatment of COVID-19 was initiated and induction chemotherapy for APL was continued. On the ninth day of chemotherapy, the patient complained of sudden severe abdominal pain accompanied by a drastic drop of hemoglobin and hemodynamic instability. Computerized tomography (CT) of the abdomen showed SRS. Although the risk of complications was high due to DIC and thrombocytopenia, TAE of the splenic artery as a lifesaving emergency intervention was successfully performed. A few hours after the intervention abdominal pain had disappeared and hemodynamic stability was established. After 2 weeks, a follow-up CT scan revealed no signs of splenic hemorrhage.

Conclusion: A favorable outcome in our patient suggests that TAE of the splenic artery should be considered in patients with hematological malignancies who experience SRS during chemotherapy and before the development of hemodynamic instability.

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Chronic Liver Diseases and COVID-19 – Review of Literature and Single Center Experience

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Background: The COVID-19 pandemic poses a serious challenge to healthcare systems globally. It quickly became clear that certain comorbidities posed a risk for severe COVID-19 and poor outcome. As the number of patients increased, SARS-CoV-2 was found to cause a respiratory infection with numerous extrapulmonary manifestations, including liver damage.

Methods: This review discusses current knowledge on the COVID-19 and liver, giving the clinicians updated data on this issue. The authors also present 58 patients with chronic liver disease and COVID-19 treated in the Clinic for Infectious and Tropical Diseases during on-going pandemic. This retrospective study includes patients with pre-existing chronic liver diseases (chronic hepatitis B and C, autoimmune hepatitis, primary liver cholangitis, primary sclerosing cholangitis, alcoholic liver disease, NASH, and indeterminate chronic hepatitis).

Results: Majority of patients were diagnosed with chronic hepatitis B and C (24.1% and 20.7%, respectively). Four patients had had a liver transplant and all of them had a favorable course of COVID-19. Autoimmune and alcoholic liver diseases were the etiologies associated with lethal outcome ($p=0,024$). End-stage liver disease and hepatocellular carcinoma were predictors of death among patients with COVID-19, which was in concordance with published data ($p<0,001$).

Conclusions: This study gives additional insight in significance of chronic liver diseases in patients with COVID-19. Liver disease with autoimmune etiology poses a serious risk in patients with COVID-19, as well as advanced liver disease and liver carcinoma.

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The Necessity of Intensifying Antidiabetic Therapy in the Conditions of Severe SARS-CoV-2 Infections – Presentations of Patients

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Background: SARS-CoV-2 is a pathogen that causes symptoms of human respiratory tract infection. It has been shown that severe forms of SARS-CoV-2 infection cause not only glucoregulation disorders in patients with diabetes, but also clinical manifestations in individuals who have previously had clinically unrecognized DM type 2. **Method/Aim of the paper:** The paper presents two patients with DM type 2 suffering from a severe SARS-CoV-2 infection, hospitalized in the Covid facility 4, UCC Niš. **Cases presentations:** The patient T.Z. with undiagnosed DM type 2 (HbA1c 9.9%). He was hospitalized due to SARS-CoV-2 pneumonia and the need for oxygen therapy. Due to the registered hyperglycemia on admission, with the value of 25.2 mmol/L, the patient was treated with Intravenous Crystalline insulin. Medium-acting Neutral Protamine Hagedorn (NPH) insulin was then introduced, shortly after followed by a conventional Intensive insulin therapy (IIT) regimen.

The patient P.M. is a person suffering from a long-term type 2 DM receiving dual oral antidiabetic therapy, who has similar clinical and radiological manifestations of the SARS-CoV-2 infection. In addition to large glycaemia variations, the patient also requires an introduction of crystalline insulin into the therapy, and soon afterwards has to be transferred to the IIT regimen as well. **Conclusion:** Above mentioned patients are typical diabetic patients with the severe SARS-CoV-2 infection in whom it is necessary to rapidly intensify antidiabetic therapy, bypassing the classic therapeutic algorithm in the treatment of type 2 DM.

Key words: SARS-CoV-2 infection, type 2 diabetes mellitus, insulin therapy.

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COVID-19 and Acute Severe Ulcerative Colitis: Case Report

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Background: COVID19 has changed our work in practice, and until then there has been growing concern regarding the impact of COVID19 on patients with chronic conditions, especially inflammatory bowel diseases. Majority of IBD patients are treated with immunosuppressant and biologics, making their immunological response to Sars Cov 2 unpredictable.

Case presentation: In this report, we present a patient with acute severe ulcerative colitis, who was admitted to our hospital due to positive rapid test on COVID19. On admission, he had 15 stools, with presence of blood in more than 50% (pMayo score 9), accompanied by epigastric pain that propagates under the left rib cage, as well as increased body temperature up to 38C. Previously, he was treated with Infliximab. Due to allergic reaction Infliximab was discontinued, and Vedolizumab was started. Upon admission, therapy according to National COVID19 protocol was started, with antiviral drug (Remdesivir) with parenteral steroids. Throughout hospitalization, patient was without signs of viral pneumonia. As there were no signs of clinical improvement of ulcerative colitis, as well as no further COVID19 progression occurred, but further deterioration, urgent total colectomy was indicated. Patients undergoing colectomy in COVID circumstances, but no complication occurred.

Conclusion: Delaying the necessary surgical intervention due to COVID-19 can be fatal, therefore we recommend that COVID hospitals have an available surgical room or an efficient integrated network with other centers. On the other hand, it is important to highlight the importance of multidisciplinary approach in acute severe ulcerative colitis, especially in times of COVID19 pandemics.

Key words: acute severe ulcerative colitis, inflammatory bowel disease, COVID19, colectomy

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COVID-19 in Liver Transplant Patient With Hepatic Failure: Case Report

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Background: It is well known that SARS-CoV2 causes liver injury, but our knowledge on clinical presentation and severity of COVID-19 in liver transplant patients is insufficient.

Case presentation: Therefore, we report a case of a young liver transplant patient infected with COVID19, previously hospitalised in non-COVID hospital due to hepatic failure. Liver transplantation occurred 2009, due to autoimmune hepatitis. After a positive RT-PCR test for COVID19, the patient was transferred to our facility. At the admission, the patient was respiratory stable. Therapy according to National COVID19 protocol was started with addition of therapy for hepatic insufficiency according to guidelines. Posttransplant management included immunosuppressive therapy with tacrolimus and low dosage of oral prednisolone. The dosage of tacrolimus was optimised according to blood levels and systemic methylprednisolone (80mg/day) was started. The synthetic function of the liver continued to deteriorate, with rise of bilirubin blood levels, as well as levels of INR, D dimer, serum creatinine and urea. On day 14 of admission, acute respiratory failure was seen. After discussing the patient's condition in a multidisciplinary team, the patient was transferred to the ICU. Afterwards, significant worsening was seen on chest X-ray and increase in D-dimer and ferritin levels was noticed. On day 17, the patient was intubated, despite several rescue efforts, the patient died.

Conclusion: Risk factors such as immunosuppressive therapy and other comorbidities are making liver transplant patients prone to severe forms of COVID-19. Ferritin levels in liver transplant patients better correlate with the stage of COVID-19, than CRP.

Key words: liver transplantation, autoimmune hepatitis, COVID19, hepatology

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Onset of Systemic Lupus Erythematosus in Patient With Ulcerative Colitis after COVID-19 - The Mystery That Was Hidden: Case Report

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Background: It is well known that some viruses can modify and even induce autoimmune diseases. There are several data that suggest association of COVID19 with onset of different autoimmune diseases.

Case presentation: Therefore, we report a case of a female patient with the diagnosis of ulcerative colitis, initially presented as acute severe form in February 2021 when she was hospitalised as COVID19 negative. Flexible sigmoidoscopy revealed severely active ulcerative colitis (Mayo subscore 3), confirmed on histopathology. Therapy according to ECCO guidelines was initiated. Since optimal response after three days was achieved, maintenance therapy, Azathioprine with Infliximab, was planned because of the initial severe presentation. However, patients reported recurrence of symptoms with fever, abdominal pain, and increased C-reactive protein. After abdominal CT scan, in lower parts of the lung, ground glass opacities were seen, and rapid antigen test on COVID19 was positive. Since the patient refused admission in COVID hospital, she was sent home. Anti-TNF α therapy (Infliximab) was started two weeks after full recovery from COVID19. Endoscopic remission was achieved at week 24. However, arthralgia and constant pain under the left rib cage persisted even after successful treatment of colitis. After rheumatologists' examination, diagnosis of systemic lupus erythematosus was made in February 2022.

Conclusion: Two weeks after the resolution of symptoms in mild COVID19 cases, it is safe to start or continue with anti-TNF α therapy. IBD patients are susceptible individuals, hence regular follow up is recommended. There is a strong belief that in genetically predisposed patients, COVID19 can trigger autoimmune disease.

Key words: inflammatory bowel disease, systemic lupus erythematosus, COVID19, gastroenterology

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Impact Of COVID-19 Pandemic on Prehospital and Intrahospital Time-Dependent Performances of Treatment for Patients with Acute Ischemic Stroke – Experience of a Tertiary Healthcare Centre

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Background: The outbreak of COVID-19 pandemic has posed major challenges to the process of urgent care for patients with acute ischemic stroke (AIS), who require the earliest possible recanalization therapy.

Methods: Retrospective data analysis was conducted on patients with AIS treated with recanalization therapy at the Department of Emergency Neurology, University Clinical Centre of Serbia in the period March-June of 2019 (when pandemic didn't exist), 2020 (right after the pandemic proclamation) and 2021 (when the health system has already adapted to pandemic circumstances). Besides demographic and clinical characteristics, for each patient we calculated time that elapsed from onset of symptoms to hospitalisation, from hospitalisation to recanalization therapy, and total time from onset of symptoms to onset of treatment. Functional outcome assessment was performed after 3 months using mRS scale.

Results: The study included a total of 84 patients clustered by year (25/2019, 30/2020 and 29/2021; [p=0.512]). There was no statistical difference in time required to reach the hospital: medians 2019/2020/2021 amounted 120/95/135.5 minutes (p=0.441), nor a significant delay in "door-to-needle time" (medians 2019/2020/2021 - 75/83/99.5 minutes [p=0.549]) was identified between three patient groups. The overall time period from the onset of symptoms to the initiation of therapy was 180/175.5/235 minutes during 2019/2020/2021 (p-value of 0.481 showed no statistical difference). Furthermore, comparison of patients' three-month functional outcomes didn't show statistical significance (p=0.922).

Conclusions: Despite challenges facing the healthcare system, treating AIS patients with recanalization therapy at a tertiary health centre has shown relative resistance to the pandemic side effects.

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COVID-19 in Young Woman in Third Trimester Pregnancy-Case Report

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Background: It has been proposed that the COVID-19 can induce the immune system more intensively in pregnant women, and that the cardiorespiratory changes of pregnancy can lead to more severe cases of pneumonia.

Case presentation: A 20-year-old primiparous woman who was COVID-19-positive at 36 weeks of gestation and who developed severe acute respiratory distress syndrome.

After a ten-day history of fever, cough, headache, sneezing, sore throat and malaise, she was referred to a hospital. She has a personal history of asthma and tachycardia. Upon admission to the hospital a "low dose" chest computed tomography scan revealed bilateral multifocal ground-glass opacities with partial consolidation, corresponding to COVID-19 pneumonia with a severity score 18/25. On the first day following admission she was on oxygen support SpO₂ was 95% with a 5 L/min with oxygen mask. On the fourth day after admission, her respiratory condition rapidly deteriorated, and the SpO₂ was 89% with a 30 L/min on high flow nasal cannula. An emergency caesarean section was performed, and a 2784-g male infant was delivered with an Apgar score of 9/10. On the twenty-fourth day after admission a CT scan revealed a severity score 25/25 but clinically the condition had improved, with an SpO₂ of 99% with a 10 L/min with oxygen mask. She was discharged 15 days after delivery when the CT scan revealed a complete resolution of the inflammatory changes.

Conclusion: Our case indicates that in younger patients, sometimes the radiological and clinical findings do not correlate, and the recovery is faster than expected.

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COVID-19-Associated Pulmonary Aspergillosis in Patients with Acute Leukemia

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Background: Patients with coronavirus disease 19 (COVID-19) have increased susceptibility to secondary respiratory infections including invasive pulmonary aspergillosis (IPA). COVID-19-associated pulmonary aspergillosis (CAPA) is difficult to diagnose and can be associated with increased mortality especially in severe immunodeficiency such as hematological malignancies. Our study evaluates IPA in COVID-19 patients defined as COVID-19-CAPA among patients with acute leukemia (AL).

Patients and treatment: A retrospective single-center study analyzed 46 patients with COVID-19 and acute leukemia, admitted to the Clinic for Hematology, Clinical Center of Serbia, Belgrade between the 2 April 2020 and 15 May 2021. During hospitalization, all participants were diagnosed with probable IPA according to the previous consensus definitions. Positive serology and galactomannan (GM) detection values in bronchoalveolar lavage (BAL) and serum were used as microbiological criteria.

Results: COVID-19 associated probable IPA was found in 22% (9/41) tested patients, where serum GM and IgM anti-Aspergillus antibodies were positive in 12% (5/41) and 10% (4/41) had positive serology for aspergillosis. One patient died while eight recovered during follow-up.

Conclusion: Our study showed that COVID-19 might be a risk factor for IPA development in patients with AL. Early diagnosis and prompt treatment are required as reported mortality rates are high.

Keywords: Aspergillus; COVID-19; acute leukemia

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COVID-19 and Delivery

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Background: COVID-19 caused by SARS-CoV-2 is an infectious, systemic disease with major pulmonary involvement. Pregnant women have suppressed immune systems, therefore may be at increased risk of developing severe or critical disease, in particular pneumonia and respiratory failure, but as well are at higher risk for developing preeclampsia, coagulopathy and preterm birth. Although data on vertical transmission are uncommon, neonates born to COVID-19 positive mothers are also at increased risk for admission to the neonatal ICU.

Methods: We monitored 118 confirmed COVID-19 positive pregnant women, who gave birth from November 2020 to February 2022. Data on the severity of the clinical picture, childbirth, pregnancy outcomes, and newborn outcomes were obtained by reviewing medical records.

Results: Cesarean section was done in 53 (44.91%) and 65 (55.09%) of women were in vaginal delivery. Total number of born babies was 123, of which 16 were preterm (13%) and 1 (0.81%) was stillborn at 29th week of gestation. Average gestational age was 37.9 weeks and average Apgar score in the first minute was 8.8. All neonates were PCR tested and 3 of them (2.44%) were positive. IgG antibodies were found in 13 neonates (10.5%). Only 6 mothers (5%) had to be admitted to ICU due to the worsening of their general condition. Unfortunately, one mother (0.84%) died 6 days after cesarean section.

Conclusion: COVID-19 itself is not an indication for ending pregnancy and delivery. Cesarean section was done according to obstetric indications or due to patient deterioration. Maternal and neonatal outcomes are generally favorable.

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Clinical and Laboratory Characteristics, Course and Outcome of COVID-19 in Patients with Multiple Myeloma

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Background: During the Covid19 pandemic, patients with multiple myeloma (MM) are particularly vulnerable due to the characteristics of their disease. The aim of study was to analyze clinical and laboratory characteristics, course and outcome of COVID-19 in patients with multiple myeloma.

Methods: The study included 53 patients with MM and Covid 19 infection, diagnosed during period March 2020 - November 2021 (27 male; 26 female, mean age 62 yrs, range 37- 87 yrs). IgG MM was present in 28pts (53%), IgA in 8 (15%), IgM in 3pts (6%), and BJ in 14 (26%). According to the clinical stage (CS, Durie-Salmon), distribution was as follows: III 44pts (83%); II 4pts (8%); I CS 5pts (9%). Renal impairment existed in 18pts (34%). Regarding ISS score, the group included: ISS1 had 18pts (34%), ISS2 12pts (23%) and 23pts (43%) had ISS3. According to the Revised ISS (R-ISS) score, R-ISS1 was found in 9pts (17%), R-ISS2 in 20pts (58%) and R-ISS3 in 13pts (25%). All pts were treated according to National Protocol for the Treatment of COVID-19, including: antibiotics in 53pts (100%), corticosteroids in 50pts (94%), low molecular weight heparin in 52pts (98%), intravenous immunoglobulins in 26pts (49%). During period January 2021 - November 2021, 9 of 24pts (37.5%) were vaccinated against Covid19. Variables of importance were analyzed using descriptive and analytical statistics. All calculations were made in SPSS program version 26.0.

Results: At the moment of detected COVID-19, 37pts (70%) had active MM, and 16pts (30%) were in the state of follow-up during remission of disease. Immunoparesis was present in all of 37pts (74%) with active MM. Elevated interleukin-6 (IL-6) was found in 19pts (36%), of which 15pts (78.9%) had active MM. Similarly, elevated d-dimer was found in 46pts (87%), of which 35pts had active disease. During the course of COVID-19, pneumonia was registered in 52pts (98%), bleeding in 2pts (4%) and thrombosis in 4pts (8%). Bleeding and thrombosis were registered in patients with active

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MM. In the Intensive Care Units were treated 7pts (13%), with a lethal outcome of 6pts. In the Semi-Intensive care were treated 36pts (64%). A total of 36pts (64%) were cured and 17pts (36%) died. The average time to recovery of our pts was 14 days (max up to 45 days). After recovery 20pts (55%) had active myeloma, reinfection was found in 5pts (13.5%) and they were in an active phase of disease. All 5pts (10%), who were previously vaccinated against Covid19 during MM remission, completely recovered from COVID-19. Additionally, 4pts (8%) were vaccinated after recovery from COVID-19.

Patients with active MM had significantly worse outcomes of COVID-19, (Chi-Square, $p=0.003$). Immunoparesis was highly frequent in pts with active disease (Fisher Exact Test, $p=0.000$), as well as elevated d-dimer (Fisher Exact Test, $p=0.002$). Increased IL-6 was observed in pts with active MM, but statistical significance was not established (Chi-Square $p=0.088$). The poor treatment outcome of pts with MM and Covid 19 was influenced by: Age (T-Test, $p=0.022$), Renal impairment (Chi-Square, $p=0.032$), and high R-ISS score 3 (Mann Whitney, $p=0.042$).

Conclusion: A significantly worse outcome of COVID-19 may be expected in patients with active MM and renal impairment, elevated d-dimer and IL-6, as well as immunoparesis and R-ISS score 3. All vaccinated patients recovered from Covid 19 infection.

Vitreous Humor as a Sample in Postmortal Detection of SARS-CoV-2

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Background: Autopsies have been proven to be essential in revealing the Covid19 pathogenesis. However, SARS-CoV-2 RNA genome is sensitive to postmortem degradation in the body, making the laboratory detection of the viral RNA in nasopharyngeal (NP) swabs challenging. Vitreous humor (VH) is known for its ability to resist the postmortem changes for a longer time period. The conjunctiva has been considered to be a place of possible virus entry, but could also be a potential source of contamination during VH biopsy. This study aimed to assess the VH as a plausible specimen for postmortem SARS-CoV-2 detection.

Methods: The study was performed in the Institute of Forensic Medicine, Medical Faculty, University of Belgrade. After a double PCR confirmation of SARS-CoV-2 presence in the NP swabs in 50 deceased subjects, two additional samples were taken, conjunctival swabs and VH biopsy. Both samples were used for detection of the SARS-CoV-2 RNA by quantitative reverse transcriptase PCR (qRT-PCR).

Results: Out of the 50 subjects, 8% (n=4) of them had positive VH biopsies for SARS-CoV-2 RNA. The positive result in conjunctival swabs was found in 12% (n=6). However, in only one case both tests were positive. Viral RNA remained stable and detectable in native samples without preserving mediums for at least 6 months after sampling.

Conclusions: This study showed that VH biopsies and conjunctival swabs can be regarded as alternative samples for postmortem SARS-CoV-2 detection. Also, the presence of the SARS-CoV-2 RNA in VH should not be considered a result of contamination through the conjunctiva.

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Rehabilitation after COVID-19

– case report

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The 67-year-old patient was treated at the UCCS for respiratory failure caused by Covid 19 virus from 11 January to 23 February 2022. She was vaccinated with three doses of Sinopharm vaccine. The clinical course was complicated by renal failure and rectorrhagia.

Rehabilitation began in ICU, first by positioning on the side and turning the patient several times a day. When the number of respirations decreased below 30/min, resting oxygen saturation was over 93% and when PaO₂/FIO₂ was below 60% the patient was placed in a sitting position, first by raising the headboard and then transferring it to the edge of the bed two or three times a day. The general state of breathing capability and fatigue were monitored. The therapy was performed every day under the supervision of a physiatrist and with the assistance of a physiotherapist.

By transferring to the ward, verticalization continues and the patient is brought to a standing position. The need for O₂ limits the activation space to the area around the bed and to walking in place. Breathing exercises and low-intensity muscle training were conducted with constant monitoring of heart rate and O₂ saturation. In moments of complications, the physical program is interrupted.

Key words: Covid 19, respiratory failure, rehabilitation

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The Role of Antioxidant Genetic Profile in COVID-19

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Background: Due to the role of oxidative stress in the pathophysiology of COVID-19, it is biologically plausible that inter-individual differences in patients' clinical manifestations might be affected by antioxidant genetic profile. Therefore, the aim of our study was to assess the distribution of genetic polymorphisms of antioxidant genes: glutathione S-transferases (GSTM1 and GSTT1 deletion polymorphisms, GSTA1 rs3957357, GSTM3 rs1332018, GSTP1 rs1695 and rs1138272), as well as genes of Nrf2 rs6721961, SOD2 rs4880 and GPX1 rs1050450 and GPX3 rs8177412 in COVID-19 patients and controls, with special emphasis on their association with laboratory biochemical parameters.

Materials and methods: The antioxidant genetic polymorphisms were assessed by appropriate PCR methods in 229 COVID-19 patients and 229 matched healthy individuals.

Results: Our results showed that carriers of variant GSTM3*CC genotype have higher odds for symptomatic COVID-19 development ($p=0.024$). Conversely individuals carrying variant GSTP1*Val allele exhibited lower odds of symptomatic COVID-19 development ($p=0.002$). On the other hand, polymorphisms of SOD2 and GPX1 influenced COVID-19 patients' laboratory biochemical profile: SOD2*Val allele was associated with increased levels of fibrinogen ($p=0.04$) and ferritin ($p=0.033$), whereas GPX1*Leu allele was associated with D-dimmer ($p=0.009$).

Conclusion: Further studies are needed to clarify the exact roles of specific glutathione S-transferases in SARS-CoV-2 infection. Our findings regarding the influence of SOD2 and GPX1 polymorphisms on the higher levels of inflammation and coagulation parameters are of clinical importance because this could provide a more personalized approach for better recognition of COVID-19 patients prone to thrombosis and for the need of targeted antioxidant therapy.

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Pulmonary Function Tests in Patients after COVID-19

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Background: Changes in the lungs caused by COVID-19 can lead to impaired lung function. Recent recommendations suggest that only patients with severe COVID-19 should be referred for pulmonary function evaluation (PFT) 12 weeks after completion of treatment. The aim of this study was to evaluate PFT in both moderate and severe COVID-19 patients in the recommended period.

Methods: PFT was performed in 52 patients with no prior respiratory disease 3 months after COVID-19, analyzing the forced vital capacity (FVC), forced expiratory volume in the first second (FEV1), FEV1/FVC ratio, and the diffusing capacity for carbon monoxide (DLco). Data are presented using descriptive statistics, while comparison of different variables in relation to the disease severity was performed using the Chi-Square and t-test. The null hypothesis was tested with a significance threshold of $p < 0.05$.

Results: The study included 52 patients (36 males, 16 females) of mean age 55.9 ± 11.5 years (30-75 years), with 22 patients (42.3%) after severe COVID-19. The average values of PFT parameters are: FVC- 82.1 ± 16.5 (52.1-124.9), FEV1%- 83.9 ± 17.7 (49.1-121.7), FEV1/FEV%- 82.9 ± 7.3 (64.3-97.3), DLco%- 72.5 ± 22.6 (37-122). Reduced FVC was found in 20 patients (38.5%), while 4 patients (7.7%) had reduced FEV1/FVC values. DLco was reduced in 34 patients (65.4%), but did not differ statistically significantly in relation to the severity of the disease ($p > 0.05$).

Conclusion: A significant number of patients had reduced diffusion capacity for carbon monoxide, although without statistically significant difference in relation to the disease severity. We conclude that the evaluation of pulmonary function is also important in patients after moderate COVID-19.

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Clinical characteristics of 191 Hospitalized Patients with Pneumonia infected with SARS CoV-2 from March to May 2020

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Background: Coronavirus disease (COVID-19) is an infectious disease caused by the SARS-CoV-2 virus. The purpose of the study was to present the clinical manifestations of hospitalized COVID-19 patients at the beginning of pandemic.

Methods: Retrospective, single-center analysis of 191 hospitalized patients with confirmed COVID 19 pneumonia in Clinic for pulmonology, University Clinical Center of Serbia, from March to May 2020. year was performed.

Results: The median age was 62,12 + 15.51 years, 114 (59.7%) were men. Among analyzed patients 148 (77.5%) had one or more comorbidities. Arterial hypertension was noticed in 112 (58.6%), diabetes mellitus in 47 (24.6%), cardiovascular diseases in 56 (19.1%), and malignancies in 11 (3.8%) patients. Chest X-ray showed bilateral pneumonia in 165 (86.3%) patients. Respiratory failure was found in 72 (37.7%) patients. Invasive mechanical ventilation was performed in 16 (8.4%) patients, while non-invasive ventilation including high flow oxygen therapy in 56 (29.3%). Medical therapy included antibiotics, corticosteroids, anticoagulants and antifungal therapy. Immunomodulatory therapy including interleukin 6 antagonist (tocilizumab) was applied in 23 (12%) patients. Lethal outcomes were noticed in 44 (23%) patients.

Conclusion: Older age, male sex, comorbidities were estimated as higher risk factors for severe form of COVID-19 disease.

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Open Vascular Repair of Two Ruptured Abdominal Aortic Aneurysms in COVID-19 Patients - Vaccinated and Unvaccinated Case Series

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Background: Although endovascular repair of ruptured abdominal aortic aneurysm is the first choice of treatment thanks to local anesthesia, shorter intraoperative time etc.

Cases presentations: We present two openly repaired ruptured abdominal aortic aneurysms operated in COVID hospital Batajnica. Patients had a similar background regarding age, demography, personal and family history. Both patients prior to the operation were hospitalized and treated for active COVID 19 infection. Preoperative MDCT angiography verified the ruptured abdominal aortic aneurysm in both cases. Open vascular reconstruction with interposition of Dacron 18mm graft were performed with satisfying early postoperative results. In later postoperative time, the vaccinated patient had a continuous recovery regarding the surgery and COVID infection and was discharged from hospital on 8th postoperative day with scheduled checkup in 6 months. Even though vascular intervention and postoperative vascular status haven't changed, unvaccinated patient condition deteriorated due to the severe bilateral pneumonia, ending in fatal consequence. Studies showed that COVID is a contributing factor causing arterial and venous thrombosis due to many factors, for example endothelial lesion, studies gave evidence of COVID's increased triggering of metalloproteinase and collagen destruction in aneurysms wall. We analyzed Chest X rays, NLR, arterial blood gasses, interleukin-6 etc. and came to the conclusion that vaccination was a major if not critical factor apropos the final outcome of our patients.

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The Significance of Initial D-Dimer Levels in the Prognosis of Disease Severity and Outcome in Younger Hospitalized COVID-19 Patients

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Background: COVID-19 is associated with a high degree of inflammation and coagulopathy. D-dimer levels increase in elderly patients and in the presence of comorbidities, while in younger patients they may be a potential prognostic factor for disease outcome. The aim of the study was to examine the prognostic significance of initial D-dimer levels in assessing disease severity, outcome and in-hospital mortality in COVID-19.

Methods: The study included 127 COVID-19 patients (91 males and 36 females, aged 25-65 years) hospitalized at The Clinic for Infectious Diseases of The University Clinical Center Niš during a five-month period. According to the Treatment Protocol for COVID-19 (Version 13), they were divided as follows: Group I (n=33; form 2), Group II (n=60, form 3), Group III (n=34, form 4), and additionally in the Surviving (n=101) and Non-surviving Group (n=26). We retrospectively analyzed initial D-dimer levels measured using the quantitative latex method (<230 ng/mL). The data were statistically processed.

Results: The mean D-dimer value is 542.1±562 ng/ml in the study population, 295.61±211.8 ng/ml in Group I and 830.3±725.8 ng/ml in Group III ($p<0.005$), while in Non-surviving Group it is 920.2±668.8 ng/ml. Considering the prognosis of the milder clinical form (form 2), levels >290 ng/mL have a sensitivity of 67% and a specificity of 71% (AUC 0.731;95%CI:0.635-0.827). The levels >726 ng/mL predict mortality risk with sensitivity of 62% and specificity of 88% (AUC 0.793; 95%CI: 0.694-0.892).

Conclusion: A threefold increase of admission D-dimer levels can help in the stratification of patients requiring hospitalization and enhanced monitoring during treatment.

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Prevalence, Localization and Significance of CT-Proven Soft Tissue Hematomas and Risk Factors for Their Occurrence in Patients with COVID-19

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Background: Anticoagulant therapy in patients with COVID-19 increases the risk of developing soft tissue hematomas. The aim of study was to examine the prevalence of CT-proven soft tissue hematomas and to monitor the frequency of risk factors, as well as the severity of bleeding based on laboratory analysis.

Methods: A retrospective study was conducted at Covid Hospital in Kruševac, in the period from 01.10.2021. to 01.01.2022, which included patients in whom the presence of soft tissue hematomas was proven by CT.

Results: In a retrospective analysis, we describe 18 cases of CT-proven soft tissue hematomas with a prevalence of 0.93% (out of total 1934 hospitalized patients), including 7 (38.88%) multifocal, with the most common localization in m. rectus abdominis - 10 patients (55.55%). Among the most common comorbidities are hypertension - in 15 patients (83.33%), renal failure - 6 patients (33.33%), diabetes mellitus - 4 patients (26.66%), arrhythmias - 2 patients (11.11%). The mean age of the patients was 70.17 ± 10.57 . Ten patients (55.55%) were on therapeutic doses of low molecular weight heparin (LMWH) before the occurrence of hematoma, 5 patients (27.77%) on prophylactic, and 3 patients (16.66%) without anticoagulant therapy. A statistically significant decrease in hemoglobin ($p < 0.0001$) and hematocrit ($p < 0.0003$) was shown during the period of hematoma development.

Conclusion: Due to the frequency, localization and severity of bleeding in soft tissue hematomas, in addition to further research due to dose standardization, continuous education on the technique of LMWH application is necessary.

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Obesity as a Risk Factor For Severe COVID-19 – Case Report

Nina Marković¹, Jovana Vučić¹

Background: Obesity has reached epidemic proportions in Serbia with nearly half of the adult population falling into this weight category. Several studies have clearly demonstrated that obesity leads to significantly worse COVID-19 disease, thus requiring extra attention and precaution for obese patients during this pandemic.

Case presentation: Two patients in their early 40s, male and female, obese, are admitted to the Covid Hospital Kruševac with SARS-CoV-19 pneumonia. Clinically with fever, cough and fatigue, requiring oxygen therapy; upon admission with no known comorbidities. Treatment as per guidelines was started including LMWH, antibiotics and antiviral medication. Despite multidisciplinary approach and adequate treatment both patients showed rapid deterioration with SpO2 below satisfactory levels. Immediately, both patients were shifted to the ICU and put on non-invasive ventilator support, but continued to decline and were thus put on mechanical ventilation. Both patients died in the ICU as a result of acute respiratory distress syndrome (ARDS).

Conclusion: Obese patients have poorer outcomes when infected with COVID-19, including respiratory failure, the need for mechanical ventilation, and a higher mortality rate. Obesity prevention is obviously required in order to reduce morbidity and mortality of the next pandemic. Physicians should recognize that obese patients are at a higher risk of developing severe illness and as such should be treated more aggressively and be under constant supervision.

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Performing Expected In Unexpected Conditions- Challenges in Interventional Radiology During COVID-19 Pandemic: Percutaneous Biliary Drainage-Case Report

Aleksandar Tasić¹, Pavle Pešić¹, Dragan Stojanov^{1,2}

Background: Percutaneous biliary drainage is interventional radiology procedure indicated in cases of obstructive jaundice, leading to decompression of biliary tree, allowing in some cases surgical and/or oncological treatment. It is performed on a patient during local anesthesia and intravenous analgosedation by combined ultrasound and fluoroscopic guidance, following all surgical principles of asepsis/antisepsis and radiation protection. During COVID-19 pandemic, the usual functioning of the Interventional radiology department was challenged in many aspects.

Methods: Four groups of challenges were recognized: establishing and confirming indications, determining and engaging necessary resources, protection during procedure and performing successful procedure.

Results: Main problem with our patient suffering from jaundice caused by pancreatic cancer was distance from Interventional radiology department- him being treated in regional general hospital, therefore established indication had to be confirmed (via digital media) as enough dilatation for successful procedure before transport. Angio-room was in a green zone- therefore the procedure was planned to take place in an Operating Room dedicated to infected patients, provided with mobile fluoroscopy and ultrasound. Protection was acquired by anti epidemic suits, lead protective gear and disposable sterile surgical coats. Adequate technique and real-time imaging at all times were secured by the presence of both radiologist and radiology resident.

Conclusions: Percutaneous biliary drainage can be performed safely and successfully even in conditions of pandemic if established indications are confirmed, if necessary resources are available, and if interventional radiology team is well trained and adaptable to new conditions.

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Mental Health and Quality of Life among Dental Students during the COVID-19 Pandemic

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Miloš Lazarević¹, Milica Jakšić Karišik¹, Svetlana Jovanović¹

Background: It is known that the COVID-19 pandemic had a significant impact on the quality of life and mental health of the entire population and students were recognized as a particularly vulnerable population group. The aim of this study was to reveal the impact of COVID-19 on quality of life and mental health among dental students.

Methods: A cross-sectional study was conducted on a sample of 797 (207 male and 592 female) students, from Dental School of Medicine, University of Belgrade, during the winter semester in December of 2021. The instruments used in the study were socio-demographic and exposure to COVID-19 questionnaire, COV-19 – Impact on Quality of Life questionnaire (COV19-QoL), Patient Health Questionnaire (PHQ-9) and Generalized Anxiety Disorder 7-item (GAD-7) scale.

Results: About half of the students had symptoms of infection, were tested and in self-isolation due to pandemic. Of the total respondents, 69.8% had family members with infection symptoms and 24.3% had death in a wide family caused by Coronavirus disease. The prevalence of moderate and severe anxiety symptoms during the pandemic was 19.5% while prevalence of moderate and severe depression was 31.2%. The COVID-19 had a more pronounced impact on quality of life and anxiety among female students ($p < 0.05$). The occurrence of deaths in the family had a significant impact on the quality of life ($p < 0.05$), while the level of anxiety and depression was higher but without statistical significance.

Conclusions: The study shows that dental students' mental health during the pandemic is at high risk which is why preventive measures need to be taken.

Keywords: COVID-19; Quality of life; Patient Health Questionnaire (PHQ-9); Generalized Anxiety Disorder (GAD); Dental students.

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A Case Report of Multidrug-Resistant Bacterial Infection in Critically Ill COVID-19 Patient

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Background: Bacterial superinfections have been reported in COVID-19 patients but there are limited data on incidence, causative microorganisms, resistance patterns, and their impact on morbidity and mortality in critically ill patients.

Case presentation: We describe the case of a multi-drug resistant bacterial superinfection in a 56-year-old critically ill COVID-19 patient. The patient was hospitalized on the seventh day of moderately severe COVID-19 due to bilateral pneumonia. Initial treatment included oxygen therapy, antibiotics and immunomodulatory drugs (corticosteroids and Janus kinase inhibitor). Following five days of hospitalization the patient's condition deteriorated and he was transferred to Intensive Care Unit (ICU) for oxygen therapy escalation and further monitoring. Chest X ray revealed extensive bilateral inflammatory consolidations. A further two weeks of noninvasive mechanical ventilation and other intensive supportive care produced a good clinical response. Forty eight hours after being discharged to the ward the patient's condition worsened with a new episode of acute respiratory failure caused by secondary lower respiratory tract infection. The patient was readmitted to ICU due to intubation. Applying local microbiological data empiric antibiotic treatment started with colistin, vancomycin and voriconazole. Microbiological findings of sputum revealed multidrug-resistant *Acinetobacter* spp. and *Klebsiella pneumoniae* sensitive only to ceftazidime-avibactam. Consequently, ceftazidime-avibactam was introduced instead of colistin. Two days after the introduction of ceftazidime-avibactam the patient showed significant improvement and was extubated following five days of therapy.

Conclusion: Infections with multi-drug resistant bacteria are shown to be late complication in critically ill COVID-19 patients with repercussions on clinical course, patient management and outcome.

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Medical Nutritional Therapy in the Treatment of COVID-19 Patients

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Background: Medical nutritional therapy (MNT) is an important factor in the body's immune and metabolic defenses, an integral part of a multidisciplinary approach in the treatment of patients with COVID-19.

Methods: The specifics of determining diet therapy are in correlation with the existing comorbidities and were carried out using the available standard and individual diets, derived from the Dietary Scheme of the University Clinical Center of Serbia.

The most commonly prescribed diets: General, Diabetic, Light, High protein, met the basic nutritional requirements in terms of adequate intake of energy and building substances, vitamin and mineral composition, while special diets: types of pureed diet, nasal tube diet, diarrhea, due to specificity often supplemented by enteral nutrition.

Results: Total energy (E) intake for patients with mild to moderate symptoms requires 25-35 kcal / Kg / BW, while for critically ill patients up to 30 kcal / Kg / BW. For patients with moderate infection, the recommended amount of protein is 20-25% of the total energy, or 1.2-1.3 g / Kg / BW; while for critically ill patients, 25-30% of the total E is ideal, or 1.3-1.5 g / Kg / BW. The recommended amount of fat is 25-30% of the total E, or 1-1.5g / Kg / BW. Minimum intake of carbohydrates is 2 g / kg / BW daily. The fat carbohydrate energy ratio is 30:70 for patients with respiratory distress, up to 50:50 when oxygen support is needed. Supplementation with micronutrients are recommended during the disease and during the recovery period.

Conclusion: MNT is one of the main components of comprehensive treatment of patients with COVID-19.

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Acute limb ischemia associated with Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) Infection

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Background: Coagulopathy induced by severe acute respiratory syndrome coronavirus 2 infection (SARS-CoV-2) can be an underlying cause of acute limb ischemia (ALI), the sudden decrease in perfusion of an extremity. Objective: to present a series of ALI cases associated with SARS-CoV-2 infection.

Methods: This single-center, observational cohort study evaluated incidence, risk factors, clinical, laboratory and radiological presentation, barriers to diagnosis, treatment options, and outcome of patients with SARS-CoV-2 infection induced ALI.

Results: The study comprised 14 patients diagnosed with COVID-19 induced ALI during the 20 months period. Most of the patients were male (78.6%), with mean age of 67 years, with body mass index >30, and had typical cardiovascular risk factors. Only 64.3% of ALI patients with COVID-19 underwent attempts of limb salvage; 14.3% required primary amputation; 21.4% were treated with systemic anticoagulation only. Mortality rate was high (42.9%). Revascularization (surgery/endovascular) was successful in 7 (50%) ALI patients. The overall rate of major amputation was 28.6%.

Conclusions: The high incidence, even with administered thromboprophylaxis, high mortality rate and poor limb salvage outcome of ALI associated with SARS-CoV-2 urges clinicians to apply individually tailored diagnostic approaches and therapeutic treatment for each patient. The use of prolonged systemic heparin might improve surgical treatment efficacy, limb salvage and overall survival.

Key words: COVID-19 coagulopathy; acute limb ischemia; anticoagulation; embolism and thrombosis; revascularization

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Respiratory Rehabilitation after COVID-19

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Patients who develop a severe case of COVID-19 will experience several stages of treatment. Rehabilitation should be included in all phases of treatment: as part of the acute phase that takes place in intensive and semi-intensive care units; during the subacute phase in the hospital ward and during the long phase, for example when patients return home and are still recovering. The number of individual problems that occur after COVID-19 and their relative frequency are not yet known. However, in addition to affecting the respiratory system, the virus can affect: the heart and cardiovascular system, the brain directly (encephalitis) and indirectly (secondary to hypoxia or vascular thrombosis), kidney function, blood clotting, gastrointestinal tract. Detailed information on the prognosis after COVID-19 is currently lacking. Until proven otherwise, decisions should be made on the assumption that long-term irreversible tissue damage will be relatively rare, and recovery of most problems will take 12-24 months. Therefore, effective rehabilitation can provide evidence-based interventions based on pre-existing evidence in rehabilitation.

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Impact of COVID-19 on Patients With Cancer, Experience of Clinical Center of Vojvodina and Institute of Oncology of Vojvodina

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Background: The impact of COVID-19 on cancer patients should be considered in terms of their immunocompromising condition, and in particular the susceptibility as a consequence of the ACE2 receptor expression in cancer tissue. The study aims to assess the influence of SARS-CoV-2 in cancer patients at the UCCV and the Institute of Oncology of Vojvodina.

Methods: Study included 163 cancer patients with COVID-19 (101 men and 62 women, average age 69), treated at the University Clinical Centre of Vojvodina. We analyzed the clinical parameters of COVID-19, treatment regimen, vaccination state, as well as the mortality rate in the group of patients suffering from carcinoma.

Results: Of the 163 oncology patients, 55 (33.7%) had mild, 71 (43.5%) moderate and 37 severe (22.7%) forms of COVID-19. In total, 121 (74.2%) of them were treated with corticosteroids. The rate of antiviral therapy administration was low – 5/163 received remdesivir, 3/163 molnupiravir and monoclonal antibody 9/163. A total of 40.9% of oncology patients were vaccinated with at least two doses: 45 Sinopharm (68.2%), 10 Pfizer (15.1%), 5 Sputnik (7.6%), 2 AstraZeneca (3%). The mortality rate was 26.4%.

Conclusion: Faced with a pandemic, health systems have had to adapt their infrastructure at all levels, and the success of that process could be measured by providing an optimal level of health care for cancer patients.

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Real life experience in immunomodulatory treatment approach to moderate and severe COVID-19 pneumonia

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Background: We aimed to analyze clinical presentation and outcomes from patients with moderate and severe COVID-19 pneumonia who received either baricitinib or tocilizumab monotherapy according to National protocol for COVID19 treatment.

Methodology: We performed a retrospective comparative study. Data from hospitalized patients with moderate and severe COVID-19 pneumonia (saturation \geq 94% or $<$ 93%; less or more than 50% pulmonary infiltrates; respectively) that were treated with baricitinib or tocilizumab collected consequently from November 2021 to January 2022 from two Departments at Medical center Bežanijska kosa. Our primary objective was to compare differences in clinical presentation and outcomes.

Results: A total of 64 patients were analyzed: 49 (76.6%) in the baricitinib and 15 (23.4%) in tocilizumab monotherapy group. The mean age was 60.2 years (SD 14.1) and 70.3% (45/64) were male ($p=0.002$). Patients who were treated with baricitinib had symptoms for longer time before admission to hospital (8.39 ± 3.02 vs 6.3 ± 2.3 , $p=0.019$). Patients who were treated with tocilizumab were more febrile on admission (86.7% vs 44.9% , $p=0.004$), had higher IL6 (132.6 ± 95.7 vs 26.6 ± 24.8 , $p<0.001$) and CRP values (105.9 ± 65.4 vs 58.2 ± 45.7 , $p=0.003$) on the day of drug administration. Overall 59 (92.2%) patients were discharged ($p=0.954$) without difference in the days of hospitalization (16.5 ± 6.2 vs 19.2 ± 8.4 , $p=0.180$). No difference between two groups was observed in progression to the need for greater oxygen support during hospitalization.

Conclusion: Tocilizumab was administered to the patients who were estimated to be more prone to the „cytokine storm“. Baricitinib was equally effective as treatment monotherapy in proper indications. No difference in outcome in both groups shows that the treatment approach was adequate.

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Proper Death Certification in the Time of COVID-19 Pandemic: Forensic Overview

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Background. It is well known that the quality of death certificates (DC) determines the accuracy of public health mortality data. Forensic pathologists, as well as other physicians, need to know the true definition of a COVID-19 death and the rules for completing the DC, as it is of crucial importance for keeping accurate and reliable mortality statistics.

Methods. Presentation and analysis of 4 SARS-Cov-2 positive case scenarios, and consequent categorisation of cases as „death from COVID-19” or „death with COVID-19”. Overview of possible ways to fill out a death certificate.

Results. We presented one case of death from COVID-19, and three cases of deaths with COVID-19. In two cases of natural death, underlying causes of death were COVID-19 and colon cancer, respectively. In the third case, manner of death was violent, and the underlying cause of death was a suicide gunshot in the head. In the fourth case, the cause and manner of death were undetermined, due to late post-mortem changes.

Conclusions. We believe that COVID-19 should be enlisted under part II or section “note” (if it exists in the DC form in a particular country) of the DC in all suicide instances and putrefied bodies with positive autopsy swab for SARS-CoV-2. In addition to our suggestions for the completion of the DC in some COVID-19 instances, we feel that forensic pathologists should follow the WHO criteria for proper DC completion in COVID-19 cases. Better physician education regarding death certification would increase adherence to existing standards.

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A Giant Hepatic Echinococcus Cyst and Covid Pneumonia – case report

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Background: Operating on patients with either asymptomatic or symptomatic COVID-19 increases the risk for perioperative morbidity and mortality. Cystic echinococcus can be asymptomatic for up to several years until complications occur. Identification and treatment are mandatory due to the mortality rate of non treated complications.

Methods: Case report of a 67 years old caucasian male patient, with Ag+ COVID test and closed fracture of the diaphysis of the right humerus with dislocation of fragments. It was obtained that the patient was an ethylist and knew about grade III kidney failure from before.

Results: Initial chest MSCT revealed COVID pneumonia (score 12/25, progressive stage) and a large echinococcal cyst 154x91x144 LLxAPxCC was observed as an incidental finding. Third day of the hospitalization, the patient underwent emergency surgery due to suspected cyst rupture without prophylactic therapy with mebendazole. Cyst puncture is performed surgically, with evacuation of over 2000 ml of daughter cyst contents, and after that germination membrane curettage was done. HP finding verified echinococcosis.

Conclusion: It is suggested that elective surgical procedures should be delayed until the patient is no longer infectious and has demonstrated recovery from COVID-19. However, we present the case of COVID pneumonia (12/25) pts with severe comorbidities who was successfully operated on the third day of hospitalization due to emergency indication. Orthopedic care was delayed for later due to priorities in his care.

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Retroperitoneal Hemorrhage and Heparin-Induced Thrombocytopenia in COVID-19 patient

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Background: Thrombocytopenia and coagulopathy are common complications of SARS-CoV-2 infection. Increased use of anticoagulant therapy carries the risk of complications such as bleeding, but also heparin-induced thrombocytopenia (HIT).

Methods: 6 patients with mild and moderate COVID19 pneumonia according to the National protocol were included in the study. Diagnosis of HIT was based upon 4T score and positive titer of PF4/heparin-reactive antibodies. Clinical course in one patient was complicated with pulmonary embolism, 5 was without complications and we present a case of a patient with retroperitoneal bleeding.

Results: A 74-year-old man presented with 7 days of fatigue, fever and cough, positive PCR COVID test and MDCT confirmed pneumonia (score 10/25). The platelet dropped from 204x 10⁹/L to 109x 10⁹/L on 9th day of hospitalization. He had an intermediate pretest probability for HIT with 4T score of 5 and PF4/heparin antibodies positive. Low molecular weight heparin was discontinued and the patient was switched to fondaparinux. Two days later, he started to complain about right flank pain and abdominal CT scan revealed a right retroperitoneal and iliac muscular hematoma. Embolization was successfully performed and the patient was discharged on the 36th day of hospitalization.

Conclusion: Widely available PF4-dependent enzyme immunoassay (EIAs) has high sensitivity and poor specificity for HIT. In COVID patients different reactivity patterns in HIT tests were reported. Because of this, it is mandatory to perform a functional test for HIT confirmation which was not available in our case.

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Hepatitis C Virus With Vasculitis Manifestations in COVID-19 Patient – Case Report

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Background: Besides the pulmonary manifestations it is clear that COVID19 affects the circulatory system causing multiple thrombotic vasculopathies. There is scarce data relating to COVID19 induced vasculitis. Our case report considers this topic.

Case report: We report a case of a 63 years old male patient with a history of chronic Hepatitis C virus (HCV) infection who was tested positive for COVID19 after he presented with hypotension and acute gastrointestinal bleeding. In personal history besides HCV he was diagnosed with gastric MALT lymphoma and polyneuropathy. Upon admission symptoms of hypovolemic shock and systemic infection were present. On auscultation lower lung fields with bibasilar inspiratory crackles were observed. Laboratory results were as follows: WBC (9.7GL), HGB (122gr/L), D-dimer (3.51 mg/L) and C-reactive protein (79.4mg/L). X-ray showed bilateral ground-glass distribution with predominance in lower zones. Ultrasound examination revealed gastric distension and distended transverse colon. Emergent endoscopy was performed and presence of pyloric stenosis with two gastric ulcers on cardia was verified - histology yielded lymphoid and metaplastic changes suggestive of vasculitis. During the hospital course there was no need for oxygen support. HCV patients may develop extra-hepatic manifestations such as mixed cryoglobulinemia and lymphoma but there are infrequent reports of virus induced vasculitis which can be interpreted as COVID19 related.

Conclusion: Endothelial inflammation with COVID19 induced thrombotic vasculopathy is so far elucidated. But alongside this patho-dynamic phenomenon vasculitis can ensue triggering further tissue damage giving severe and complex clinical manifestations. COVID19 can involve organs with versatile mechanisms complicating the presentation of the disease.

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Regencov as The First Line of Defense – Our Experience

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Background: Casirivimab-imdevimab (RegenCov) is a neutralizing antibody cocktail that has been shown to prevent symptomatic disease in patients with coronavirus disease 2019 (COVID 19), due to reduction of viral load. RegenCov was authorized for treatment of mild to moderate COVID 19 in high risk patients, which are those with chronic kidney disease, respiratory and cardiovascular disease, diabetes mellitus, immunocompromised patients, BMI $\geq 25\text{kg/m}^2$ and age ≥ 65 years. The aim of this study was to show our results in treating patients with RegenCov in University Clinical Center of Vojvodina

Methods: All adult patients who received RegenCov in our center from 09 may 2021 to 31 january 2022 were selected and followed up for at least 28 days. Patients were divided in two groups: those who didn't need a hospitalization, and those who demanded hospital treatment due to Covid 19 complications. Groups were compared.

Results: We have included 69 high risk patients. Median age was 58, 52,2% were male, and 47,8% were vaccinated against Sars-Cov-2. 79,7% had at least 1 medical comorbidity. Chest X ray showed signs of incipient pneumonia in 23.2 % of patients. During the follow up period 15,9% of patients demanded hospitalization, and 2,9% died. The main differences between two groups were the presence of pneumonia and number of medical comorbidities.

Conclusion: Our study showed that in high risk patients, use of RegenCow lowered the risk of hospitalization and it was associated with a low rate of deaths due to Covid 19 infection.

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Molnupiravir for Treatment of COVID-19 Non-Hospitalized Patients

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Background: The coronavirus disease 2019 (Covid-19) pandemic, caused by severe acute respiratory syndrome has seen almost 395 million confirmed cases and over 5.7 million reported deaths worldwide. Molnupiravir is an oral, small-molecule antiviral prodrug that is active against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Molnupiravir reduced the viral replication SARS-CoV-2, causing COVID-19.

Methods: The study included 74 nonhospitalized patients due to mild/moderate Covid 19 with symptom onset within 5 days. Molnupiravir is administered as four 200 milligram capsules taken orally every 12 hours for five days, for a total of 40 capsules. The primary efficacy endpoint was hospitalization for any cause or death within 29 days. Antiviral activity was assessed as time to undetectable levels of viral RNA by reverse transcriptase polymerase chain reaction and time to elimination of infectious virus isolation from nasopharyngeal swabs At day 5 of treatment take second PCR test.

Results: In our study molnupiravir significantly reduced the risk of hospitalization from 5% (4/74). No deaths were reported throughout day 29. Twenty five patients had bilateral COVID - 19 pneumonia before the molnupiravir treatment and at day 3 of treatment 17/74 but there is no statistically significant difference ($p=0,241$). On day 5 the virus was isolated from 69,1% (29/42).

Conclusions: The oral antiviral molnupiravir when given within 5 days after COVID 19 symptom onset lowered the risk of hospitalization or death in vaccinated/unvaccinated, at risk patients. This study can be used as a vantage point in other larger studies on the use of Molnupiravir.

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The Role of Pro-Oxidative and Pro-Inflammatory Markers in Patients with SARS-CoV-2 Infection

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Oxidative stress caused by the SARS-CoV-2 virus may play a significant role in cytokine storm initiation and immunopathogenesis of acute pulmonary insufficiency. In this study, pro-oxidative and pro-inflammatory status was determined in patients with Covid 19 virus infection. The research was conducted in the period from October 2021 to November 2022 at the University Clinical Centre Niš-Kovid Hospital Niš and Kovid Hospital Kruševac. A total of 145 patients divided into two groups participated in the research. The first (control) group included 36, healthy, non-Covid 19 patients. The second (experimental) group included 109 patients. Criteria for inclusion in the experimental group were: positive PCR test for SARS-CoV-2, clinically significant disease (T>38°C, dyspnoea, cough), bilateral pneumonia, and acute respiratory failure (SpO₂<90%), with one or more comorbidity-coronary heart disease, hypertension, heart and kidney failure, diabetes mellitus type II. SARS-CoV-2 infection in patients in the experimental group led to a statistically significant increase in pro-oxidative (Total oxidative status-TOS, Lipid hydroperoxide, H₂O₂, TBARS, Xanthine oxidase, NADPH oxidase) and pro-inflammatory (IL-1β, IL-6, TNF-α) markers in comparison to the results detected in the control group. There is a significant association between oxidative stress, pro-inflammatory mediators, and multiorgan dysfunction and damage. Early laboratory determination of non-standard parameters, such as pro-oxidative markers, could significantly predict the further clinical course of the disease in patients with SARS-CoV-2 infection.

Keywords: SARS-CoV-2, oxidative stress, pro-inflammatory markers

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Results of The Use of Molnupiravir in the Early Stage of Treatment of Non-Hospitalized Covid Patients

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Background: Today, priorities in pandemic control are: vaccination and antiviral drugs. A major relief for treatment of non-hospitalized adults with mild or moderate Covid-19, at high risk of developing pneumonia or be hospitalised or have at least one risk factor, without oxygen support, is the early taking of Molnupiravir. The Molnupiravir in oral form includes doctors in the first 5 days, twice a day at 800 mg in the respiratory centre of the PHC system, who make the first contact and perform triage to higher centres.

Methods: Retrospective analysis data of included 65 patients in 1-31.1.2022.who agreed to take a drug, in the first 5 days of illness, with at least one risk factor, without contraindications: dialysis, severe liver disease, transplantation, pregnancy, lactation, younger than 18 years, active cancer, platelet count below 100, absolute neutrophil count below 500/mm³.

Results: There are more man (n=34;52,3%), for man: average age 58,18±10,89, average BMI 30,50±5,18, for woman: average age 57,55±11,56, average BMI 30,59±5,88. The oldest man and woman: 94 years, 88 years, with overweight 73,53% man, 87,10% woman. Vaccinated (n=44;67,7%), unvaccinated (n=21;32,3%) with comorbidities: most had two (n=37;56,9%), day of drug inclusion: third (38,5%) fourth (27,7%), at least first (3,1%), none had an increase sat, alt, only four side effects (n=4;6,22%) 3,1% GI aliments, 1,5% vertigo, 1,5% allergic. Only three patients (n=3; 4,6%) developed pneumonia: two-man, one woman, all unvaccinated, only one hospitalized (n=1;1,55%).

Conclusions: Molnupiravir included in the early stage is effective in reducing pneumonia, hospitalizations, without serious side effects. The Molnupiravir is exceptional.

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Safety and Mental Health of Employees During COVID-19 Pandemic

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The purpose of this article is to determine the place of safety and mental health in relation to the Covid 19 pandemic on a global level based on newly published studies.

The Covid-19 pandemic has negatively affected the mental health of many people and created new barriers for those who are already suffering from mental illness and substance use disorders.

As Covid-19 has caused a sharp economic downturn and a rise in unemployment, job loss is associated with increased depression, anxiety, distress and low self-esteem and can lead to higher substance use and abuse, substance use disorders and suicide. People who lost their jobs during or due to the pandemic have a more pronounced simultaneous presence of anxiety and depressive disorders (42:35%); only anxiety disorders (26:23%); only depressive disorders (6:5%); compared to the general population. With respect to the stress caused by the pandemic, it has been reported that those who lost their job or reduced their volume of work have a high degree of distress (34: 27%), compared to the general population.

During the Covid-19 pandemic, approximately 32% of the UK residents reported that they couldn't get help from mental health professionals when they needed it.

All these data point to the need to consider and improve the quality of occupational safety and mental health of employees during the pandemic. The legal system has a very important role in this process, because it sets the framework which enables the subjects of employment to maneuver their rights and obligations during the pandemic.

Key words: Covid-19; Mental health, Safety

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Deep Vein Thrombosis and Pulmonary Embolism In COVID-19

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Background: Pulmonary embolism (PE) and deep vein thrombosis (DVT) are one of the complications of COVID-19 due to systemic coagulation activation. We are presenting data from our department.

Method: This is observational retrospective study. Sample obtained patients from the period of six months from single-institution, Department 5 of Covid hospital Batajnica and consisted of 27 patients. Inclusion and exclusion criteria were ascertained on the basis of diagnostic methods (CT pulmo-angiography and CDS).

Results: Both sex had similar incidence rate of DVT and PE in our study with male patients representing 51.9% of the total patients versus 48.1% of female patients. Mean age was 74 ±13 years. Every patient had at least one of the comorbidities with HTA being most common (81.5%). On admission every patient was treated with LMWH (85.2% prophylaxis versus 14.8% of patients being treated with therapy doses because of increased risk for thrombosis, Wells score >2, antiXa 0.6-1.0). Only 50% of the patients with PE on whom have been performed CDS after CT had been diagnosed with DVT at the same time. Increased levels of D-dimer (>0.5mg/L and >1.0mg/L) showed high sensitivity (100% and 95.8%) in diagnosis of PE and DVT.

Conclusion: DVT and PE are two complications of Sars-Cov-2 infection whose early diagnosis and proper treatment can prevent fatal outcomes. However DVT and PE can occur in COVID-19 patients with severe pneumonia despite adequate prophylaxis. Half of the patients with PE lacked DVT.

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Pulmonary Barotrauma in COVID-19 Patients on Invasive and Noninvasive Ventilation

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Background: A number of studies have reported an increased incidence of pulmonary barotrauma such as pneumothorax, pneumomediastinum, and subcutaneous emphysema in patients with COVID-19. These are life-threatening conditions, especially in critically ill patients. In our study we evaluated the incidence, clinical outcomes, and characteristics of barotrauma in COVID-19 patients receiving invasive and non-invasive ventilation.

Methods: This retrospective cohort study included patients diagnosed with COVID-19 pneumonia who developed pulmonary barotrauma and required oxygen support with invasive or noninvasive ventilation between March 31st and November 30th, 2020 and descriptive analyses were performed.

Results: 59 patients developed evidence of barotrauma on Chest Xray or Computed tomography with a mean age of 62.26, where 43 (71.93%) patients were men and 16 (28.07%) were women. The average length of hospitalization was 18.14 days, with a mortality of 78.95% . 52 (87.72%) patients were on invasive ventilation, where 14 (24.56%) of them required a later tracheostomy. There were 7 (12.28%) patients on non-invasive ventilation, and the largest number of them on NIV- 4 (57.14%). The most common barotrauma types to appear were pneumothorax (63.16%), subcutaneous emphysema (56.14%) and pneumomediastinum (47.37%). The percentage of patients with associated barotrauma was 49.12%, where 44.83% had pneumomediastinum and subcutaneous emphysema and 27.59% had all three. The median time between ventilation and development of barotrauma is 4.4 days.

Conclusions: Patients with COVID-19 pneumonia have a high incidence of pulmonary barotrauma. Barotrauma in these patients was associated with a longer length of hospitalization, longer ICU stay, and higher mortality.

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Tracheostomy in Mechanically Ventilated COVID-19 Patients

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Background: During the COVID-19 pandemic, a large number of critically ill patients were admitted in ICU. Majority of them had bilateral pneumonia or acute respiratory distress syndrome and required invasive mechanical lung ventilation. Although tracheostomy is often performed for prolonged endotracheal intubation, this procedure remains controversial in COVID-19 patients with major concerns regarding staff safety, patient risk-benefit, technique and timing.

Method: An observational nonrandomized study was performed on COVID-19 ICU patients who received invasive mechanical ventilation. They were selected and divided into two groups – tracheostomy and non-tracheostomy. The decision to perform tracheostomy was made by a multidisciplinary team (anesthesiologist, surgeon and ENT specialist). Following the recommendations, tracheostomy was performed at least 7 days after intubation in patients estimated to require prolonged ventilation.

Results: This study included a total of 125 mechanically ventilated COVID-19 ICU patients. Of total, 22 (17.6%) patients had tracheostomy. Patients with tracheostomy had longer ICU stay (31.5 days in average) and duration of mechanical ventilation (19.5 days in average). Mortality rate was significantly lower in the tracheostomy group ($p < 0.001$). Overall mortality for all mechanically ventilated patients was higher than 80%.

Conclusion: Our study has shown that the application of tracheostomy in mechanically ventilated patients in the ICU setting is safe, both for patients and for the healthcare staff who perform it. We hope that in the future more studies will prove the benefit of this technique.

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Retrospective Analysis of Patients with Multiple Sclerosis In North Macedonia, Vaccinations, Treatment and COVID-19

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Background: The spread of the new SARSCoV-2 virus and coronavirus disease 2019 (COVID-19) resulted with unique challenges in the management of the people with multiple sclerosis (PwMS). The risk of COVID-19 is not bigger in PwMS compared to healthy individuals, but the severity of disease is bigger in the PwMS with cardiovascular comorbidities. So far, contraindications for vaccination are not described in PwMS. To collect data about the infection, hospitalization, vaccination and impact of COVID-19 in MS treatment practices.

Methods: Between July and August 2021, we conducted an online survey among the PwMS covering the patient's characteristics, experience with COVID-19, vaccination rate and change of the disease-modifying therapy regimen.

Results: Hundred and thirty PwMS from North Macedonia completed the e-survey, 73% females. Most of the participants (41%) were 36-45 years old. 33% reported COVID-19, which resulted in a 7% hospitalization rate. 67%, reported that COVID-19 had not influenced the regular use of DMTs. More than half of the participants were vaccinated, majority of them with tozinameran/COVID-19 mRNA vaccine, with low impact on the regular usage of DMTs.

Conclusions: The people with multiple sclerosis have higher risks for infection with SARS-CoV-2 virus and hospitalization compared to the general population. However, the COVID-19 and vaccination had a low impact on the regular usage of DMTs.

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COVID-19 and Cerebrovascular Diseases

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Background. Ischemic stroke (IS) and thrombosis of carotid arteries are life-threatening complications of coronavirus disease 2019 (COVID-19) infection. Increasing reports suggest an association between COVID-19 and IS, although the underlying mechanism remains uncertain. **Material and Methods.** We analysed single-centre experience to characterise the clinical characteristics, neuroimaging findings, and outcomes of IS in COVID-19 patients from 1st December 2019 to February 2022.

Results. All cases reporting IS occurrence in COVID-19 patients were included. The pooled incidence of AIS in COVID-19 patients from observational studies was 3.3% (48/1466) with a mean age of 63.4 ± 13.1 years. The mean duration of IS from COVID-19 symptoms onset was 10 ± 8 days, and the mean NIHSS score was 19 ± 8 . Laboratory investigations revealed an elevated mean d-dimer (9.2 ± 14.8 mg/L) and fibrinogen (5.8 ± 2.0 g/L). Antiphospholipid antibodies were detected in a significant number of cases. The majority of IS neuroimaging patterns observed was large vessel thrombosis, embolism or stenosis (62.5%, 30/48), followed by multiple vascular territory (27%, 13/48).

Conclusions. We report the incidence of IS in COVID-19 patients to be 3.3%, with a high mortality rate. Elevated d-dimer, fibrinogen and the presence of antiphospholipid antibodies appear to be prominent in COVID-19 patients with concomitant IS, but further mechanistic studies are required to elucidate their role in pathogenesis.

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“Guillain-Barré Polyradiculoneuritis as a post-covid complication”

Roza Dimova Panzevska¹

Background: Guillain-Barré syndrome (GBS) is an inflammatory polyradiculoneuropathy linked with several viral infections. Recently, there have been many case reports describing the relation among COVID-19 and GBS. The aim of this research is to present Guillain-Barré polyradiculoneuritis as a post-covid complication.

Methods: The authors consider that the description of this case will contribute to a better understanding of the strength of the bond between this syndrome and the COVID-19 features.

Results: Clinical examination showed generalized weakness and hyporeflexia. The cerebrospinal fluid (CSF) analysis showed albuminocytological dissociation. The electrophysiological assessment proved a segmental demyelinating polyneuropathy. The clinical presentation and severity of this case was similar to those with non-COVID-19 GBS. COVID-19 is believed to cause a dysregulated immune system, which likely plays an important role in the neuropathogenesis of GBS.

Conclusion: GBS-associated COVID-19 appears to be an uncommon condition with similar clinical patterns to GBS before the pandemic. Future studies should compare patients with COVID-19-associated GBS to those with contemporaneous non-COVID-19 GBS and determine whether the incidence of GBS is elevated in those with COVID19.

Keywords: Guillain-Barré polyradiculoneuritis, post-covid complication

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Thrombocytosis in Patient with Diagnosed ITP, Treated With TPO Agonist, During COVID-19

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Background: Immune thrombocytopenic purpura (ITP) is a blood disorder characterized with low platelet count, with unknown background.

Case report: Patient M.M, was diagnosed with ITP 17 years ago. She has been on continuous therapy with TPO agonists (Eltrombopag, 75mg p.o.) for the last several years. All this time her platelets count was normal. She was admitted to our hospital because of COVID infection, with moderate thrombocytopenia (Platelet $44 \times 10^9/L$) and mild anemia (Hgb 108g/l). Therapy with TPO agonist was continued along with intermediate doses of corticosteroids (Pronison 40 mg p.o.). During hospitalization continued elevation of platelets was registered. When platelets count reached values higher than $500 \times 10^9/L$, corticosteroid therapy was suspended. And after reaching values of $840 \times 10^9/L$, TPO agonist therapy was suspended. Platelets continued to rise and reached a maximum count of $1805 \times 10^9/L$, after which they started falling. On the day of discharge platelet count was $489 \times 10^9/L$.

Conclusion: This is a case of a patient with previously diagnosed ITP, on continuous therapy with TPO agonist (Eltrombopag) for the last several years, with so far normal platelet count. During active COVID 19 infection moderate thrombocytopenia was registered in the beginning of infection. After introduction of corticosteroids in therapy, continued elevation of platelets count was spotted, with maximum values of $1805 \times 10^9/L$.

Question is, is there interaction between TPO agonists used in treatment of ITP and SARS COV 2 virus, after introduction of corticosteroids, and their impact on elevation of platelets count in this group of patients.

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Omicron SARS-CoV-2 Infection in Transplant Recipients – case series study

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Background: Transplant recipients have been reported at a high risk of severe form of COVID-19 due to chronic immunosuppression and coexisting conditions.

Methods: This was a case series study performed from 1st January until 28th February 2022, which included 4 transplant recipients with confirmed SARS-CoV-2 infection – Omicron variant. All patients were treated in the Clinic for Infectious and Tropical Diseases, University Clinical Center of Serbia.

Results: We analyzed four patients – two liver, one bone marrow and one kidney transplant recipient, all on maintenance immunosuppressive regimen. All of them tested positive by RT - PCR - Omicron variant, subtype BA.1. All of the patients had mild forms of disease, with no clinical or radiological evidence of pneumonia or pulmonary infiltrate. Laboratory investigations revealed normal inflammatory parameters in two patients, the other two had bacterial superinfection (extrapulmonary source), which was followed with increase of C-reactive protein and normal values of lactate dehydrogenase. Two of them were treated with monoclonal antibodies (casirivimab/imdevimab) and antiviral drugs (remdesivir), while in the others weren't administered specific therapy for SARS-CoV-2, in one patient had passed more than 10 days since the onset of signs and symptoms, the second one had decompensated liver cirrhosis. Three out of four patients were vaccinated against SARS-CoV-2.

Conclusion: Considering a favorable outcome despite risk factors, immunosuppressive regimen in transplant recipients could be associated with lower risk of cytokine storm and consequently severe or critical form of disease. In addition, we can't disregard potentially lower virulence of the Omicron variant, as well as significance of prompt treatment and immunization.

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Endoscopic Treatment of Obstructive Calculose Hydronephrosis in Patients Infected by SARS-CoV-2

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Background: The most common reason for obstructive uropathy is stone in the urinary tract. Kidney obstruction with signs of urinary tract infection or anuria is an urgent condition in urology. Emergency decompression is necessary to prevent further complications.

Aim of this study was to examine the impact of concomitant SARS-CoV-2 infection on the time of detection of patients with calculous obstructive hydronephrosis, the severity of the clinical course, the length of hospitalization and recovery time.

Methods: From September 2021 to February 2022, 5 patients with hydronephrosis caused by stone were treated in our center. Simultaneously with hydronephrosis in patients was confirmed SARS-CoV-2 virus infection. Urinary tract ultrasound was used to detect congestive changes in the kidneys, but the definitive diagnosis specifying the localization of the obstruction was made by radiography (X-ray) of the urinary tract or CT urography. Ureterorenoscopy (URS) with fragmentation and evacuation calculus from the ureter and placement of ureteral "JJ" stents was used to resolve the problem. Native X-ray was used to check the position of the "JJ" stent. Evaluation of the clinical course of SARS-CoV-2 infection was performed by monitoring the general condition of patients, measuring blood oxygen and oxygen support requirements, laboratory analyzes and imaging methods.

Results: 5 patients were operatively cared for, 3 females and 2 males, aged 43 (32-83). It took 4 (2-9) days from the moment of detection of SARS-CoV-2 infection to hospitalization due to stone-induced obstruction. In all patients, congestion of the affected kidney was grade II. URS was performed on the second day of hospitalization. Values of laboratory markers on admission: C-Reactive-Protein 315 (58-357), White-Blood-Cells 7.9 (1.6-24.8), Platelets 120 (54-241), Procalcitonine 10.7 (0.02-100). The length of hospitalization was 14 (8-20) days. No complications were observed in the postoperative period during hospitalization.

Conclusion: Patients with combined symptoms of obstructive hydronephrosis and SARS-CoV-2 infection were often not initially recognized. At the time of diagnosis, obstructive hydronephrosis already had a more severe form of the disease, in some cases urosepsis levels, resulting in longer hospital treatment.

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The Importance of Anticoagulation In COVID-19-Related Acute Kidney Injury Requiring Continuous Renal Replacement Therapy

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Background: In Serbia, the pandemic of the coronavirus disease 2019 (COVID-19) began in early March 2020. The aim of this study is to summarize clinical experience in the treatment of acute kidney injury (AKI) by methods of continuous renal replacement therapy (CRRT) with the focus on the amount of the administered dose of unfractionated heparin (UFH).

Methods: The study covers 12 patients treated with CRRT at the Clinical Center of Vojvodina from March 6, 2020 to May 20, 2020. Antithrombotic prophylaxis, risk of venous thromboembolism, applied therapy, biochemical parameters before and after CRRT, anticoagulation and other CRRT parameters were analyzed.

Results: The mean age of the patients was 61.54 ± 10.37 years and 7 (58.3%) were men. Padua Prediction Score for Risk of VTE ≥ 4 had 9 (75%) patients, but none developed a thrombotic event. Within multiorgan insufficiency, 7 critically ill patients (58.3%) developed AKI depending on the dialysis. The mean CRRT dose was 36.6 ml/kg/h, bolus dose of unfractionated heparin was 3250 ± 1138.18 IU, and the continuous dose was 1112.5 ± 334.48 IU/kg/h. Discontinuation of CRRT due to the clotting circuit was necessary in only one patient. The values of leukocytes, AST, ALT, GGT, aPTT, PT were significantly higher after CRRT compared to urea, creatinine, potassium, chlorine and magnesium, whose values were significantly lower.

Conclusion: Administration of pre-diluted CVVHDF with antithrombin membrane and UFH doses higher for 1/3 to 1/2 in comparison with the recommended doses, has extended the filter life with no complications in our Covid-19 patients with high inflammatory parameters and D-dimer and an estimated risk of developing DVT.

Key words: COVID 19, continuous renal replacement therapy, acute kidney injury, thrombotic events

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Characteristics of Acute Upper Gastrointestinal Haemorrhage in Patients With COVID-19 – Single Centre Experience From the Covid Hospital 'Batajnica'

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Background: Acute upper gastrointestinal haemorrhage (AGH) in COVID19 patients shows variable characteristics, distribution and specificities in reported world series during the pandemic. Aim was to present data about the AGH in COVID19.

Methods: Observational retrospective trial. Sample obtained 42 patients, from the period of six months, investigated regarding demographics, COVID19 disease onset and haemorrhagic substrate. Inclusion and exclusion criteria were ascertained on the basis of International Society for Thrombosis and Haemostasis bleeding definition.

Results: Men had significantly higher incidence rates of AGH than women (67.4% versus 33.6%, $p < 0.005$). Men older than 55 years were correlated with higher rates of major bleeding (RR of 3.2). Female sex wasn't correlated with any age stratum. Male patients were examined on the subject of high corticosteroid therapy ($\geq 2\text{mg/kg}$) and no significant association was found. Regarding COVID19 time of onset, the majority of patients had AGH with strong predilection between the seventh and tenth day of the disease (71.5% versus 28.5%, $p < 0.005$). When compared with the time of admission AGH was diversified without statistical significance. Most prevalent endoscopic AGH substrate was gastric neoplasia previously undiagnosed (44.3%), gastroduodenal ulcer (22.1%), esophageal bleeding (18.8%) or wasn't identified in the rest of cases.

Conclusion: Male patients older than 55 years were particularly prone to AGH. Mainly AGH was found between the seventh and the tenth day of the disease. Most prevalent cause of AGH was unrecognised stomach neoplasia. In COVID19 special focus should be put on male patients older than 55 years who are at risk for malignancy and AGH.

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Case Report: Digital Ischemia as First Manifestation of COVID-19

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Background: COVID-19 is connected with thrombotic events, while etiology is yet to be looked into. However, possible causes could be cytokine storm, antiphospholipid syndrome, syndrome of activation of macrophages, complement cascade, dysregulation of RAA.

Methods: Information was obtained from the Health system "Heliant".

Results: A 73 year old woman, with a history of arterial hypertension, presented to the emergency room, because of acute digital ischemia of third and fourth finger of the left hand, without any other significant symptoms. Based on radiographic signs of double pneumonia, she was tested positive with PCR for SARS-CoV-2. CT angiography of upper extremities was without any significant arterial stenosis. Other notable findings were: pulmonary embolism, deep vein thrombosis of lower extremities, pulmonary hypertension and right heart strain. Patient was treated with oxygen, using a maximal 10L/min of oxygen via oxygen mask. Throughout the hospital course, the digital ischemia remained stable and the patient was discharged after 16 days.

Conclusion: There are some case reports presenting digital ischemia in patients with COVID-19. Most of them were treated in the intensive care unit, unlike our patient. Thrombotic events could be connected with severity of infection. In the available literature, some of the cases had disseminated intravascular coagulopathy. Our patient did not meet the criteria for it. Shish et al. presented a case of a 64 year old covid positive woman with acro-ischemia and positive antiphospholipid antibodies. Surely, significance of secondary antiphospholipid syndrome and other comorbidities should not be excluded. Covid coagulopathy needs more research.

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COVID-19 in Patients with Severe Asthma Receiving Biologic Therapy- Experience from the Clinic of Allergy and Immunology, University Clinical Centre of Serbia

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Background: The treatment of patients with severe asthma presents a major health-care challenge in Coronavirus disease 2019 (COVID-19) pandemic. International recommendations suggest maintaining severe asthma under control and regular administration of biologic agents. The aim of our study was to evaluate the rate of COVID-19 in severe asthma patients receiving biological treatment, to determine the clinical course of the disease and possible risk factors for severe COVID-19.

Methods: A total of 19 patients receiving biologic therapy for severe asthma in the period between July 2020 and March 2022 were included in the study. Data relating COVID-19 were collected.

Results: Out of 19 patients, with a mean age of $44,3 \pm 11,23$ years, 68,4% were female. Eight patients (42,1%) were receiving omalizumab and 11 (57,9%) benralizumab. A total of 13 (68,4%) patients were vaccinated against COVID-19. Nine patients (47,4%) had been infected with severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) during the whole pandemic period. Three patients (15,8%) had COVID-19 during the treatment with biologic therapy, and only one of them (5,3%) had pneumonia that needed to be hospitalised and had to interrupt biological treatment. That patient was unvaccinated, older, and had hypertension and arrhythmia.

Conclusion: Our results indicate that majority of patients receiving biologic therapy (benralizumab, omalizumab) do not have increased risk for severe COVID-19 outcomes. However, unvaccinated elderly patients with cardiovascular comorbidities are at higher risk for developing severe forms of the disease. We believe that treatment with anti-Th2 biologics during COVID-19 pandemic is safe and should be continued.

Keywords: COVID-19; severe asthma; omalizumab; benralizumab; biologic therapy.

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D-Dimer, CRP, PCT, And IL-6 Levels at Admission To Icu Can Predict in-Hospital Mortality in Patients with COVID-19 Pneumonia

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Background: Prompt and effective predictors of clinical outcomes are crucial to recognize critically ill patients and improve the management of COVID-19 patients. The aim of this study was to identify potential clinical outcome predictors in critically ill COVID-19 patients.

Methods: This retrospective cohort study included 318 patients treated from June 2020 to January 2021 in the Intensive Care Unit (ICU) of the Clinical Hospital Center "Bezanijska Kosa" in Belgrade, Serbia. The verified COVID-19 disease, patients over 18 years of age and the hospitalization in ICU were the criteria for inclusion in the study. The optimal cutoff values of D-dimer, CRP, IL-6 and PCT for predicting hospital mortality were determined using the ROC curve, while the Kaplan-Meier method and log-rank test were used to assess survival.

Results: The study included 318 patients: 219 (68.9%) were male and 99 (31.1%) female. The median age of patients was 69 (60-77) years. During the treatment, 195 (61.3%) patients died, 130 male (66.7%) and 65 female (33.3%). 123 (38.7%) patients were discharged from hospital treatment. The cutoff values for in-hospital death prediction were: IL-6 74.98 pg/mL (Sn 69.7%, Sp 62.7%), CRP 81 mg/L (Sn 60.7%, Sp 60%), procalcitonin 0.56 ng/mL (Sn 81.1%, Sp 76%), D-dimer 760 ng/mL FEU (Sn 63.4%, Sp 57.1%). IL-6 \geq 74.98 pg/mL, CRP \geq 81 mg/L, PCT \geq 0.56 ng/mL and D-dimer \geq 760 ng/mL were statistically significant predictors of in-hospital mortality.

Conclusion: IL-6 \geq 74.98 pg/mL, CRP \geq 81 mg/L, procalcitonin \geq 0.56 ng/mL, and D-dimer \geq 760 ng/mL could effectively predict in-hospital mortality in COVID-19 patients.

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Difference in Clinical Presentation of Hospitalized Patients Between Delta Variant and Omicron

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The World Health Organization (WHO) declared the Covid 19 pandemic on March 11, 2020. As an Admission Triage Room of Emergency Medicine (ATR) was opened, all suspected covid patients were examined there. The delta variant, which originated in India, began spreading rapidly and making news around the middle of June 2021. Since December 2021, the omicron variant has taken over as the main mutation of COVID-19. Although the omicron variant is likely more contagious than any other strain to date, it's generally causing less severe symptoms than the delta variant.

Follow-up of patient protocols in October 2021, where there was a peak of delta variant in Serbia, examined 93 covid positive patients. Due to covid pneumonia, 60 patients were hospitalized in covid center, 16 had internal worsening and 17 patients required surgical treatment. Mechanical ventilation required 9 patients, 46 needed oxygenation and 38 did not require oxygen support.

In the period between January 15th and February 15th, 2022., when it was a peak of omicron, it examined 132 patients. Due to covid pneumonia, 45 were hospitalized in covid center, 53 had internal worsening and 34 patients required a surgical treatment. Mechanical ventilation required 7 patients, 52 needed oxygenation and 73 did not require oxygen support.

From this can be concluded that the omicron variant was incidental in most patients who required another type of treatment, but pneumonia. While the delta variant proved to be effective towards pneumonia.

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Adolescents with COVID-19 Pneumonia and Vaccination

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Background: Paediatric Department of Medical Centre „Dr Dragiša Mišović“ Children's Hospital for Lung Diseases and Tuberculosis was appointed National Paediatric Covid19 Centre since the start of SARS COV2 pandemic from March 2020. Enabling both, outpatient and inpatient, care for children from birth till 18 years of age with Covid19 disease. Vaccination of children was approved in Serbia based on the recommendations of the World Health Organization, the Ministry of Health and Institute of Public Health Serbia. Aim of this presentation is a group of hospitalised children presented with lower respiratory tract infections due to COVID-19 who were not vaccinated.

Methods and Results: We present a group of 90 children ages from 12 to 18 years who were hospitalised in our hospital from August 2021 to January 2022 with lower respiratory tract infections due to COVID-19. Chest x ray confirmed pneumonia in all, and additionally computerised tomography was performed in 11 (min. score 6/25, max score 19/25). Oxygen Therapy needed in 27 patients. Mean value of CRP was 15,5mg/l. Our experience is in complete agreement with the world literature on risk factors for the development of moderate and severe disease in COVID-19. Obesity, with a lower proportion of other comorbidities, is the most significant risk factor for a more severe clinical presentation.

Conclusion: Not one of these hospitalised patients with lower respiratory tract infection have been vaccinated with the Covid19 vaccine, although it has been possible to vaccinate children.

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Dementia and COVID-19: Case study and clinical outcome

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Background: Due to their primary diagnosis, Dementia patients are vulnerable to Covid – 19. Because of their age and other comorbidities they end up with severe complications. PHO UC of Neurology in Skopje, North Macedonia worked with Covid – 19 patients. At this time more than 80 patients with dementia were hospitalized.

Methods: This is a case study from hospitalized patients at our clinic. Used HIS (hospital information system) as source.

Results: The mortality rate in these patients was high due to the severity of the symptoms. From all the hospitalized patients with dementia 75 – 80% of them died from complications and severe pneumonia. Also to be noted that only 50% were fully vaccinated.

Conclusion: The mortality rate was high with patients that have dementia, but that was not the only risk factor that they had. Because of their age, low immunity and lack of vaccination, these patients suffered from severe bacterial infections and pneumonia which lead to death.

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Rehabilitation Treatment in Surgical Patients with COVID-19

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Background: Surgical patients are at a higher risk of having a severe course of coronavirus disease 2019 (COVID-19). The objective of this study was to determine the impact of early rehabilitation treatment on morbidity, hospital course and mortality of surgical patients who were positive for COVID-19.

Methods: A retrospective observational study was conducted to identify all hospitalized surgical patients positive for COVID-19 from September 15, 2021 to February 1, 2021 at Covid Hospital of University Clinical Centre of Vojvodina. All patients were included in early rehabilitation treatment as soon as they were clinically stable. Seventy surgical patients who had no signs of COVID-19 (COVID-19 -) were used as a control group. Clinical outcomes and complications were analyzed in both groups.

Results: 75 hospitalized surgical patients (9.68%) were positive for COVID-19. 40 (53.3%) were men and 35 (46.6%) were women. The mean age was 55.7 years (range, 18-81 years). Most of the patients had comorbidities (60.0%). The mean length of stay was 13.4 days (range, 2-32 days). Seven patients had deep venous thrombosis, and ten patients pulmonary thromboembolism. Discharge disposition was to home in 60 patients, rehabilitation facility in 7, and hospice in 3. Five patients died from COVID-19 complications. Length of stay, number of complications and mortality were significantly higher in Covid-19 positive patients.

Conclusions: COVID-19 affects outcome of patients after surgical treatment. The lung function impairment worsens the overall performance, making rehabilitation more challenging. Longer hospitalization and numerous complications in COVID-19 positive surgical patients make the demand for early rehabilitation crucial.

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Association of Chronic Illnesses with Respiratory Failure in People with COVID-19

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Background: COVID-19 can lead to respiratory failure and poorer health outcomes. Empirical studies showed that people who have chronic illnesses have a higher propensity toward poorer health outcome of COVID-19. The study aim was to assess whether having specific chronic illnesses was associated with respiratory failure in people hospitalized with COVID-19.

Methods: From January to March 2021 a cross-sectional study was conducted on people hospitalized due to COVID-19 in semi-intensive care and post-critical care units of the University Clinical Hospital Center «Dr Dragisa Misovic - Dedinje». The data from the medical records were analyzed. Chronic illnesses were classified according to organ systems. Each chronic illness was tested in a separate regression model. The models were adjusted for participants' age, gender, body mass index, computed tomography (CT) score for infection severity, oxygen saturation and lactate dehydrogenase levels.

Results: A total of 300 participants were studied. Of those, 142 (47.2%) had respiratory failure. Most people were diagnosed with hypertension (140; 46.5%), heart illnesses (57; 18.9%) and lung illnesses (54; 17.9%). The adjusted logistic regression models showed that having diabetes, neurological disorders (stroke, epilepsy) and injuries/fractures which interfere with mobility were independently associated with respiratory failure among people with COVID-19.

Conclusion: Suffering from diabetes, neurological disorders (stroke, epilepsy) and injuries/fractures which interfere with mobility contributed to the development of respiratory failure in people with COVID-19. People who have these chronic illnesses might be at higher risk of poorer COVID-19 outcomes.

Key words: COVID-19, respiratory failure, chronic illnesses

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Factors Associated with Poorer Illness Perception among People with COVID-19

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Background: The COVID-19 can influence people who were affected by this disease to perceive COVID-19 as dangerous and life-threatening. The aim of this research was to examine the illness perception among people who were hospitalized with COVID-19.

Methods: We conducted a cross-sectional study in January, February and March 2021. The study participants were people who were hospitalized at the University Clinical Hospital Center «Dr Dragisa Misovic - Dedinje», in semi-intensive care and post-critical care units due to COVID-19. Collection of data was carried out using a general socio-demographic questionnaire, Depression Anxiety and Stress scale (DASS 21) and Brief Illness Perception Questionnaire (BIPQ). Higher values of BIPQ score suggested stronger negative perception about the COVID-19. Data about complete blood count, oxygen saturation, biochemical blood parameters and COVID-severity score using computerized tomography (CT score) were extracted from the medical records.

Results: Data were retrieved from 300 participants. The average BIPQ score was 47.3 ± 12.5 (maximum range 0-80). The adjusted regression models showed that non-smokers, people who did not engage in physical activity previously and who had poorer sleep quality had stronger negative perception about COVID-19. Additionally, people who had losses of consciousness due to COVID-19 and felt distressed at onset of COVID-19, who had higher depression symptom score and lower hematocrit had stronger negative feelings about COVID-19 while recovering from the infection in the hospital.

Conclusion: People who were recovering from COVID-19 had a relatively negative perception about the infection. More severe COVID-19 symptoms, unhealthy behaviors and depressive symptoms contributed to stronger negative perception of COVID-19.

Key words: COVID-19, symptoms, illness perception, depression, healthy behaviors

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Emergency Center Belgrade Protocol for Management of Emergency Surgical Patients in SARS CoV-2 Pandemic Reality

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Background: In the apocalyptic scenario of SARS CoV-2 pandemia, emergency surgeons maintained a crucial role in management of all life-endangered patients. Even with depleted staff and resources, Clinic for Emergency Surgery, Belgrade, had to preserve operability and respond to dubious surgical emergencies. The aim of our presentation is to evaluate and share our experience in performing emergency surgery tasks, under pandemia, thus maintaining the stability of our healthcare system.

Methods: Retrospective cohort analysis of COVID- 19 patient's management, for two years period (March 2020-March 2022). We created and implemented Institutional epidemiological-surgical protocol, focused on: 1.rapid on-admission testing, 2.isolation corridor transport of positive patients to diagnostics and COVID- 19 Department, 3.isolated, I-OR and OP procedure, 4.Isolation Department as COVID- 19 surgical ICU, 5.definitive RT-PCR testing.

Results: Our cohort consisted of 1212 COVID- 19 patients, admitted, evaluated and treated exclusively in Emergency Surgery Isolation-"COVID- 19"-Department. Emergency operative treatment was mandatory in 160 patients. Non-operative treatment occurred in 1052. Male patients consisted of 60% with an average age of 64 years. Overall mortality was 5.36%. The structure of surgical diagnosis and operative procedures reflected our emergency pathology, before pandemia, consisting of acute abdominal conditions, bowel obstruction, peritonitis, hemorrhagic shock and severe trauma.

Conclusion: We successfully implemented our Protocol for COVID- 19 emergency surgery treatment, based on the leading global recommendations, with the modifications, we had adapted to our conditions. The safe and protected environment for surgical patients and healthcare providers under COVID- 19 threat is the paramount condition for the best treatment, follow-up and outcome of all surgical patients but especially the most severe ones.

Key words: SARS CoV-2, COVID-19, Pandemia, Personal protective equipment, Screening, Follow-up, Postoperative care, Emergency surgery, Open surgery, Laparoscopic surgery, Trauma surgery, Acute abdomen, Trauma Protocol

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Cardiac Manifestations in Mild COVID-19 - Case Report: Does Echocardiography Matter?

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Background: Although SARS-CoV-2 virus infection predominantly affects the respiratory organs and gives typical symptoms for respiratory infections, it does not infrequently lead to damage to the heart muscle (pericarditis/myocarditis), which occurs in 18% of hospitalised patients. Cardiovascular manifestations of myocardial involvement in COVID-19 can be the result of systemic inflammation or secondary to direct viral damage and is still a matter of debate.

Case presentation: We present a case of a 52 year old male with fever, malaise, muscle pain, headache, dry, irritating cough and severe fatigue. PCR test for SARS-CoV-2 virus was positive. The patient was treated with favipiravir for 5 days. The patient is already being treated for hypertension. He was vaccinated and revaccinated with two doses of AstraZeneca(ChAdOx1-S) vaccine. Normal leukocyte and platelet counts with lymphopenia and slightly elevated markers of inflammation (CRP 19.1 mg/L, IL6 6.0 pg/ml and ferritin 227 ng/mL) were found. D dimer, cardiac specific enzymes, and Pro-BNP were in the reference range. The ECG findings were also normal, as was the 24-hour Holter electrocardiogram. Computed tomography of the chest performed on day 5 of the disease showed no pathological changes in the lungs, while the control examination on day 11 of the disease, in the posterior segment of the right upper lobe showed two zones of ground-glass opacification (less than 5% of total lung volume) with initial consolidation. Echocardiographic monitoring of function parameters of left (EF, mitral annulus TDI and stroke volume) and right ventricle (TAPSE, FAC, tricuspid annulus TDI) found slightly reduced values at initial examination and cut-off values at follow-up after 4 weeks, with small pericardial effusion. After three months, complete resolution of the pericardial effusion was registered.

Conclusion: SARS-CoV-2 viral infection is a significant and important risk factor for myocardial damage. Echocardiographic monitoring is an important first step in the evaluation of heart muscle disease, while magnetic resonance imaging of the heart, as a complementary method, is used for more detailed assessment, especially in cases where structural changes are below the echocardiographic detection threshold.

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Diabetes Associated with Worse Outcome of COVID-19 Among Hospitalized Patients

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Background: Patients with diabetes who have COVID-19 are among the patients at greatest risk for poor outcome. These patients have a 50% higher risk of developing respiratory infection as well as a higher risk of worse outcome (higher mortality, respiratory failure) which requires their treatment in intensive care units (ICUs) and prolonged treatment.

Objective and methods: To determine the prevalence of patients with diabetes in ICUs who suffered from COVID-19, and their characteristics who were hospitalized during the period from 12.03.2021. - 12.05.2021.

Results: Out of 1479 patients, 395 had diabetes. There were 139 patients in ICUs, 45 of whom had diabetes. The number of patients with type 1 was eight ($n = 8/45$), and with type 2 forty-seven ($n = 37/45$). There were 5 patients with newly diagnosed type 2 diabetes out of a total of 37. There were statistically significantly more patients with a duration of diabetes over 10 years ($x^2 = 10,828$; $p = 0.013$). The mean value of glycosylated hemoglobin (HbA1c) was $7.64 \pm 1.68\%$. In newly discovered HbA1c it was $9.12 \pm 1.31\%$ and in others $7.42 \pm 0.9\%$ ($p < 0.01$). There was no difference in glycoregulation depending on the therapy before admission. Observing the distribution by sex in patients with type 2 diabetes, there were 22 men and 15 women in JIN (1.46: 1). The mean age of patients with type 2 diabetes was 70.67 ± 7.87 years. When we grouped patients by age, only 4.9% of patients were younger than 55 years, 33.8% were 56-70 years old, and 61.3% were over 71 years old. There was no difference in the age of the patients according to gender. The onset of symptoms before hospitalization was 5.97 days. The average oxygen saturation (SO₂) at the hospital admission of these patients was 86.7%. The most common comorbidities were cardiovascular diseases (100%), followed by chronic renal failure (40%), obesity (29.7%)

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and malignancies (21.6%), and 16.2% of patients had chronic lung disease. The mean CT Severity Score at admission was 17/25. The average number of days of hospitalization was 17.2 ± 8.6 days, and the number of days spent in ICUs was 8.9 ± 4.8 days. Patients with previous diabetes had significantly longer hospitalizations than newly diagnosed diabetics ($\chi^2 = 9,510$; $p = 0.009$). There were only 5/37 vaccinated patients. Patients who were not vaccinated were hospitalized for a statistically significantly longer time ($\chi^2 = 7,661$; $p = 0.022$). The number of days until the transfer of patients to ICUs was significantly affected by CT severity score at admission ($t = -2,303$; $p = 0.032$), but not by SO₂ at admission ($t = -0.890$; $p = 0.379$).

Conclusion: Patients with diabetes greater than 10 years, over 70 years of age, who were unvaccinated, with cardiovascular associated diseases and CT severity score on admission greater than 17/25, had a worse prognosis.

Is COVID-19 in Children Always Mild Disease?

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Background: We report a case of a 16 year old patient diagnosed with a severe form of novel coronavirus disease (COVID-19) treated in the Intensive care unit (ICU) of The Mother and Child Healthcare Institute of Serbia „Dr Vukan Čupić“.

Methods: Retrospective assessment of medical documentation with aim to present challenges of pediatric patients with COVID-19 that require intensive care. Clinical course was characterized by prolonged mechanical ventilation associated with pneumomediastinum and pneumothorax complicated by chronic bronchopleural fistula. As a consequence of the severe acute phase of the disease, interstitial pulmonary fibrosis has developed. Many difficulties were encountered during the course of the hospitalization not only with mechanical ventilation but also with hemodynamic instability, arrhythmias, intrahospital infections and abstinence syndrome.

Results: More than three months of intensive therapy, resulted in permanently damaged lung parenchyma, severe abstinence syndrome, refractory respiratory insufficiency, and eventually fatal outcome.

Conclusion: Although death in pediatric patients with COVID-19 is rare, it is more likely in children with multiple comorbidities, multiorgan involvement and need for mechanical ventilation. Such complex patients require a multidisciplinary approach in treatment.

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Life-Threatening COVID-19 Pneumonia in a 22-Year-Old Male: Case Report

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Background: It is believed that COVID-19 relatively rarely causes a severe, life-threatening clinical picture in young patients. However, caution is required in patients with severe comorbidities that may lead to a compromised immune response and a range of complications.

Case report: We report the case of a 22-year-old patient hospitalized with bilateral COVID pneumonia. He suffers from diabetes mellitus type 1 and epilepsy, and was revaccinated with the Sinopharm vaccine. He was treated according to the official national COVID protocol. Initial presentation included bilateral pneumonia, elevated values of all inflammatory parameters, and normal blood gas exchange. Rapid deterioration in his general condition with complications in the form of diabetic ketoacidosis, superinfection of *Staphylococcus* spp, *Klebsiella* spp, *Pseudomonas* spp in cultures, sepsis, and septic shock led to the ICU, where he was intubated and placed on the MV. As a complication of reintubation ten days later, tracheotomy led to the development of a pulmonary abscess.

Conclusion: A 22-year-old, previously vaccinated COVID-19 patient with immunocompromising comorbidities suffered from ketoacidosis, acute respiratory failure, need for mechanical ventilation, sepsis complicated by septic shock, tracheostomy, reintubation, and pulmonary abscess. Further research and development of protocols are needed to identify the most vulnerable patients from the group of those who are not expected to rapidly develop life-threatening conditions during COVID-19.

Key words: COVID-19 pneumonia, immunocompromising comorbidities, young patient

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Influence of Hereditary Thromboembolia and Rheumatoid Arthritis on The Clinical Course and Treatment of COVID-19

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Introduction: The treatment of COVID-19 in patients with rheumatoid arthritis (RA) is challenging, due to the autoimmune condition and the use of drugs that potentially impair the immune system. Thrombophilia is associated with the risk of thromboembolism. Coagulopathy occurs in up to more than 50% of patients with severe manifestations of COVID-19 and is associated with an increase in d-dimer or thrombosis.

Case report: An MMC patient, 51 years old, female, was hospitalized under the clinical picture of COVID-19, CT scan verified bilateral pneumonia. Since 2008, she has been treated for RA with occasional use of anticoagulant therapy due to prolonged hereditary thrombophilia. During the hospitalization, the general condition worsened and the treatment was continued in the intensive care unit. After the diagnosis of hematomas in the region of the left Iliopsoas and rectus abdominis muscles, interventional radiological care was indicated - embolization of the lumbar arteries and the left epigastric superficial artery performed. The patient's post-procedural condition was stable. Neurological examination revealed flaccid paraplegia. After 2 weeks, intra-abdominal hematoma was evacuated by surgical transabdominal approach. Post-operatively, the patient was vitally stabilized. Due to the reduced vascularization of the anterior abdominal wall, necrosis of the same occurs, so skin debridement at the site of irrigation of the epigastric superficial artery was performed, as well as resuture of the operative wound due to dehiscence. In the further course of treatment respiratory deterioration happened and exitus letalis occurs on the 49th day of hospital treatment.

Conclusion: The clinical course and treatment of patients with COVID-19 with added comorbidity such as rheumatoid arthritis and hereditary form are unpredictable, primarily due to immunosuppression and propensity to thrombosis. Since the treatment of such patients with anticoagulant therapy is imperative, in a certain percentage there is bleeding or the development of hematomas.

Keywords: COVID-19, thrombophilia, rheumatoid arthritis, coagulopathy.

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Asthma and Chronic Obstructive Pulmonary Disease (COPD) as SARS-CoV-2 Infection Comorbidities

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Background: During the pandemic, the presence of COPD and asthma comorbidity was lower than expected. The aim was to assess the mortality and severity of COVID-19 in patients with obstructive pulmonary disease.

Methods: The retrospective research included the analysis of the following data: CRP, severity, and outcome for those who were treated at the COVID ZUMC, Belgrade, Serbia June 2020. – Feb 2021.

Results: 3438 patients recovered, 572 died from SARS-CoV2 infection; 236 (87.1%) subjects recovered from some obstructive lung diseases, and 35 (12.9%) died, whereas 3202 (86.6%) subjects recovered without obstructive lung diseases and 537 (14.4%) died. Results for COPD and asthma: 89 (80.2%) recovered and 22 (19.8%) died, 147 (91.9%) and 13 (8.1%), respectively. In patients with a milder clinical picture laboratory analysis was performed – CRP 33.40 mg/L (0.1–274.6 mg/L), ferritin 344 ng/ml (10–2906 ng/ml), and D-dimer 0.96 mg/L FEU (0.17–7.43 mg/L FEU). While in those with a moderate to severe clinical picture, CRP 76.05 mg/L (0.3–402.0 mg/L), ferritin 594 ng/ml (594 ng/ml (10–594), and D-dimer 0.17–7.94 ng/ml). In those with severe clinical symptoms, CRP was 153.40 mg/L (0.3–402.4 mg/L), ferritin 1489 ng/ml (26.7382 ng/ml), and D-dimer 3.46 mg/L FEU (0.23–35.20 mg/L FEU).

Conclusion: Patients with some of the obstructive pulmonary diseases had the same mortality rate compared to other patients. Patients with COPD had a higher mortality rate and a more severe clinical picture compared with those with asthma. Patients with a more severe clinical picture had higher values of CRP, ferritin, and D-dimer as patients with a milder clinical presentation.

Key words: COPD, asthma, COVID-19

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Inflammation Markers as Predictors of Clinical Outcome in Patients With COVID-19 Treated With Anti-Covid Plasma

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Background: Faced with the COVID-19, before vaccination became available, and in the absence of specific therapy, anti-Covid plasma (CP) was used to administer antibodies to patients with more severe disease.

Material And Methods: Data were collected from the HELIANT Health Information System and statistically analyzed. Laboratory analyses (CRP, LDH, Ferritin, Fibrinogen, CBC) were performed right before the administration of the first dose and 24 hours after the second dose of CP.

Results: In the period from April 2020 and January 2021, a total of 4932 Covid-19 patients were treated at the UMC "Zvezdara", out of which 488 received CP. In the group of survivors, LDH (Med.750 vs. 930), leukocytes (Med.7.5 vs. 11.21), and neutrophils count (Med.78.56 vs. 84. 3) before CP, were significantly lower, and the lymphocyte count (Med.11.8 vs. 7.7) higher in comparison with the group of deceased. After the application of CP in the group of survivors there was a significant decrease in CRP (Med.-50.0), LDH (Med.-66.0), leukocytes (Med.0.5), neutrophils (Med.-3.09) and lymphocyte count (Med.1.1). In the group of deceased, the decrease in CRP (Med.-28.7) was smaller compared to the survivor group. LDH (Med.112), leukocytes (Med.2.1) and neutrophil count (Med.1.65) increased significantly, while lymphocyte count decreased (Med.-2.0).

Conclusion: The obtained results indicate that monitoring of inflammatory parameters in Covid-19 patients before and after CP administration can be a good predictor of the final outcome. This study had its limitations, as patients have received immunomodulatory drugs and fatal outcomes within the first 24 hours from the first CP administration were not included in the data analyses.

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Androgen Dependence in Thrombosis of Patients With COVID-19

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Background. A vascular system inflammation is a risk of venous thromboembolism and can result in widespread microangiopathy with microvascular thrombosis.

Methods. We performed laboratory clinical follow-up of patients with COVID-19 to compare gender differences. To study the sex difference in COVID-19 outcome we will measure estradiol and androgens: dihydrotestosterone (DHT) and sex hormone binding globulin (SHBG) in plasma of 63 COVID-19 patients, analyzed by ELISA. Their levels will be correlated to the adhesion molecules: soluble intercellular adhesion molecule 1 (sICAM-1), soluble vascular adhesion molecule 1 (sVCAM-1), sE-selectin, and sP-selectin as biomarkers for inflammation and thrombosis.

Results. DHT was increased (1.9 fold) in male COVID-19 patients compared to healthy male volunteers. SHBG was significantly increased in COVID-19 patients compared to healthy volunteers ($p < 0.05$) as well as female vs. male COVID-19 patients ($p < 0.001$, 2.5 fold). sVCAM-1 and sICAM-1 were increased in female COVID-19 patients compared to male COVID-19 patients and female volunteers, respectively ($p < 0.05$). The sP-selection was significantly ($p < 0.01$) increased in male vs. female COVID-19 patients. SHBG was in negative correlation with sP-selectin ($p < 0.05$). DHT was in positive correlation with sVCAM-1 ($p < 0.05$). Ferritin had 3-fold higher levels in male than female COVID-19 patients ($p < 0.001$).

Conclusions. Upregulation of androgen hormones and thrombotic biomarkers in COVID-19 patients demonstrate sex dependence.

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Body Fat Percentage and Visceral Fat as Predictors of COVID-19 Mortality and Critical Form Development

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Background: Published data regarding the impact of obesity on COVID-19 outcome are un-consistent. However, in most studies, nutritional status was assessed using body mass index (BMI) alone. Therefore, we aimed to investigate the impact of body and visceral fat on COVID-19 outcome.

Methods: Observational, prospective cohort study was conducted on 216 consecutive COVID-19 patients hospitalized in University Clinical Center Kragujevac in a period between October and December 2021. In addition to socio-demographic and medical history data, admission laboratory findings and blood gas analysis, the nutritional status was examined using the BMI, body fat percentage (BF%) and visceral fat (VF). For body weight, BF% and VF measurements bioelectrical impedance analysis (BIA) method was used. Primary end-points were considered to be lethal outcomes and critical form development.

Results: In the examined cohort, the prevalence of mortality was 16.7% (n=36), and the prevalence of critical form was 33.8% (n=73). Overall prevalence of obesity according to BMI was 39.3% (n=85), and 50.9% (n=110) according to BF%. In our cohort, VF and BF%, but not BMI, were significant predictors of mortality (OR 3.066 [95%CI 1.379-6.570], OR 2.540 [95%CI 1.179-5.470] and OR 1.930 [95%CI 0.939-3.971], respectively). Considering critical form development, all three nutritional status parameters were significant predictors, as following: BF% (OR 7.602 [95%CI 3.868-14.960]), VF (OR 2.364 [95%CI 1.325-4.219]) and BMI (OR 3.775 [95%CI 2.087-6.827]).

Conclusions: Obesity is linked with COVID-19 mortality and critical form development, with BIA measurements being stronger predictors of outcome compared to BMI.

Keywords: Body fat percentage; Body mass index; COVID-19; Obesity; Visceral fat.

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Incidental findings on CT exams of COVID-19 patients

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Background: For diagnosis of patients under investigation for COVID-19, radiology societies do not recommend routine CT screening. CT exams are recommended for patients who test positive for COVID-19 and who are suspected of having complicating features such as pulmonary thromboembolism, superimposed bacterial infection, abscess or empyema. It's not rare for the COVID-19 patients to develop gastrointestinal or neurological symptoms thus calling for other CT exams.

Methods: We reviewed CT exams of patients with confirmed coronavirus infection performed at Center for radiology, Clinical center Niš in the period of one year in order to identify a spectrum of incidental findings. Exams were classified by type. All additional findings that are not attributable to COVID pneumonia were noted and categorized according to their clinical relevance and anatomical location.

Results: Incidental findings were found in 56% of patients. As expected, the most commonly performed exam was chest CT, and the most common incidental findings were lung nodules or suspicious lung mass which were found in 37% of patients with incidental findings. In 28% of patients additional findings were clinically significant. On average, patients with incidental findings were older than the ones without any additional CT findings.

Conclusion: Particularly in older patients, a considerable number of various incidental findings were detected on CT exams performed due to COVID-19. In 28% these findings were clinically significant and called for further diagnostic evaluation or specific treatment.

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Admission Predictors of Mortality in Hospitalized COVID-19 Patients in Central Serbia

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Background: Predicting patient's mortality risk at the admission may be beneficial in terms of adequate triage and risk-assessment. Despite the pandemic burden, such study has still not been conducted in Serbia.

Methods: Observational, retrospective-prospective cohort study was conducted on 703 consecutive COVID-19 patients hospitalized in University Clinical Center Kragujevac in a period between September and December 2021. Patients were followed during the hospitalization period, and in-hospital mortality was observed as a primary end-point. Within 24 hours of admission, peripheral venous blood was sampled for routine laboratory analysis (complete blood count, biomarkers of inflammation and other biochemistry, coagulation parameters and cardiac biomarkers) and peripheral arterial blood was sampled for blood gas analysis. Socio-demographic and medical history data were obtained anamnesticly and using patients' medical records.

Results: The overall prevalence of mortality in our cohort was 28.4% (n=199). Multiple regression analysis (with Backward-Wald stepwise) was conducted on nineteen variables, which were initially selected as significant predictors of outcome in univariate analysis. The model finally singled out eight most significant admission predictors of mortality, as following: oxygen saturation < 88% (aOR 2.89 [95%CI 1.81-4.59]), Cockcroft-Gault < 60 mL/min (aOR 2.49 [95%CI 1.40-4.45]), IL-6 > 74.6 pg/mL (aOR 2.42 [95%CI 1.52-3.84]), low lymphocyte count (aOR 2.17 [95%CI 1.08-4.34]), LDH > 804.5U/L (aOR 2.10 [95%CI 1.28-3.46]), elevated high-sensitivity troponin I (aOR 1.80 [95%CI 1.07-3.15]), Charlson Comorbidity Index (aOR 1.29 [95%CI 1.11-1.50]) and duration from symptom onset (aOR 0.91 [95%CI 0.86-0.98]).

Conclusions: Parameters available on hospital admission can be useful in predicting COVID-19 mortality.

Keywords: Admission predictors; COVID-19; Mortality.

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Acute Kidney Injury in Patients Hospitalized with COVID-19 - A Single Center Experience

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Background: The coronavirus disease (COVID 19) has become a worldwide health emergency with a wide spectrum of clinical presentation. A great number of medical centers have reported that patients with COVID-19 have developed acute kidney injury (AKI). The aim of this study was to analyze incidence, risk factors and outcomes of AKI in hospitalized patients with COVID 19 who were treated from 01.04. to 01.06.2020. at Zvezdara University Medical Center, Nephrology Department.

Methods: This retrospective observational study included 51 patients who had normal kidney function before the infection with SARS COV2, and 7 of them developed dialysis non-dependent AKI. Analysis included data collection from the patients' history. Statistical analysis has been performed using SPSS.

Results: Out of 51 patients 7 (13,7%) developed AKI, mean age was 59 + 16 years and 53% were male. Diabetes mellitus was present in 2/7 of patients with AKI, hypertension in 6/7, obesity in 3/7, coronary artery disease in 1/7 and 1 of 7 patients was a smoker. These risk factors except obesity ($p=0.05$) didn't vary significantly between two groups (AKI and non-AKI patients with COVID-19). Our results showed significant correlation between AKI development and obesity ($p= 0.05$, OR 4.75), Charlson index score ($p=0.01$), D dimer score ($p=0.01$), and CT COVID score ($p=0.03$). Regarding the outcome, COVID 19 patients with AKI showed 7-fold higher risk for fatal outcome ($p= 0.046$).

Conclusion: Outcome of Covid 19 patients who developed AKI was significantly worse than in patients with SARS COV2 infection but without kidney injury.

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The Impact of COVID-19 Pandemic and Lokdown on Suicide Behavior Among Patients Admitted at Psychiatric Clinic, Nis UCC, Serbia

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Background: Anxiety, fear of death and losing the loved ones, loss of employment and homelessness are some of the social stressors due to COVID 19 pandemic, that may even trigger serious mental illnesses like depression or anxiety in previously healthy persons and likewise contribute to add burden to mentally ill ones.

Method: This cross sectional study aimed to explore possible association of COVID 19 and suicide bahaviour (suicide ideation and attempt) before and during Serbian government lockdown restrictions. We retrospectively reviewed the clinical records of 104 adult psychiatric inpatients consecutively admitted at Psychiatric Clinic, University Clinic Center Niš, during the period from May 2020. to August 2020, the period after ending lockdown in Serbia and comparing obtained results with similar data during the same period in 2019 and 2018.

Results: Suicide ideation were more frequent in 2020 comparing with 2019 and 2018 (25% vs. 12,5% vs. 9,41%, $p < 0.05$). Ajustemnt disorder was more frequent among patient with suicide attempt comparing with patients with suicide ideation (32% vs. 11%), and especially with patients without suicide ideation and attempt, the difference was significant (32% vs. 0%, $p < 0.001$). 60% of patients with suicide attempt during 2020 were not in psychiatric treatment, while this percentage was significantly lower during 2019 (60% vs. 26,67%, $p < 0.01$), and lower, but not significant during 2018 (60% vs. 37,5%).

Conclusions: Suicide prevention in the COVID-19 era is an important and difficult issue. Research studies are needed of how mental health consequences can be mitigated during and after the COVID-19 pandemic.

Key words: Suicide ideation, suicide attempt, COVID 19, hospital admissions.

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Molnupiravir in Non-Hospitalized Adults with Early COVID-19: A Single-Centre Study

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Natalija Kekic¹ and Maja Ristic¹

Background: Accelerated worldwide transmission of severe acute respiratory coronavirus 2 (SARS-CoV2-2) requires the use of an effective, available, direct-acting therapeutic to reduce the risk of progression to severe coronavirus disease 2019 (COVID-19). In our study, we evaluated the usage of nucleoside analog molnupiravir in at-risk nonhospitalized adults with early COVID-19.

Methods: We conducted a retrospective, observational, single-centre study to evaluate the efficacy and safety of treatment with molnupiravir started within 5 days after the onset of symptoms in non hospitalised adults presented with mild, laboratory-confirmed COVID-19. The study included patients treated during January 2022 with at least one risk factor for severe form of disease and followed-up for minimum 10 days subsequently. The primary composite outcome was all-cause hospitalisation while the incidence of adverse events was the primary safety endpoint.

Results: The final analysis included 171 patients; the median age was 62.9±13.8 years (with 59% aged >60 years) and 51 percent were female. Among them, 61.4% had more than one comorbidity with cardiac disease (56%) as predominant. Within 72 hours after the presentation to the emergency department, 123 (71.9%) started the treatment. During a median follow-up of 12.1±3.5 days, 157 (91.8%) patients fully recovered. The median time to clinical recovery was 4 days (IQR: 1–11 days). After 12.3±4.5days (IQR 6–23), hospitalisation occurred in 14 (8.2%) patients. There were no drug-related severe adverse events.

Conclusions: In our study, molnupiravir demonstrated a significant benefit in reducing hospitalisation in mild COVID-19 and could be an important weapon against SARS-CoV-2.

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Monitoring of Inflammatory Biomarkers Concentrations in Patients with COVID-19 Treated by Regen-Cov Therapy

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Background: The abundant release of cytokines and chemokines in severe COVID-19 patients leads to profound hyperinflammation and the mobilisation of immune cells, triggering the cytokine storm. REGEN-COV is authorised for the treatment of mild-to-moderate COVID-19 in patients with positive results of direct SARS-CoV-2 viral testing, and who are at high risk for progression to severe COVID-19, including death. The aim of this study was to monitor the changes of inflammatory biomarker concentrations in COVID-19 patients treated by REGEN-COV therapy.

Methods: A total of 16 COVID-19 patients (10 males/6 females), aged 27-77, hospitalised in Covid Hospital of University Clinical Center of Serbia in Batajnica for the period 11 November 2021 to 08 February 2022 were included. Blood samples were collected the day before drug administration, and 24 and 48 hours after. Serum C-reactive protein (CRP), procalcitonin (PCT), and ferritin concentrations were measured using the commercial assay on Architect ci8200 automated analyzer (Abbott Diagnostics, Wiesbaden, Germany).

Results: Serum CRP concentrations decreased markedly ($P < 0.001$) at 24h and 48h after administration of REGEN-COV therapy compared with the levels before treatment. Time-dependent changes in PCT concentrations showed the same pattern. PCT concentrations significantly decreased ($P < 0.001$) 24h and 48h after drug administration. Also, significant decrease ($P < 0.001$) was noticed in CRP and PCT levels between 1st and 2nd day after REGEN-COV administration. Time-dependent changes in ferritin concentrations after REGEN-COV administration were not statistically significant ($P > 0.05$).

Conclusions: Based on the obtained results, we suggest monitoring of CRP and PCT concentrations in COVID-19 patients on REGEN-COV therapy.

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Excess Deaths Associated with COVID-19 Pandemic In Novi Pazar, Serbia: July 2020

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Background: Serbia was one of the countries in Europe and the world that was most affected by the coronavirus disease (COVID-19) pandemic. City of Novi Pazar was the greatest coronavirus hotspot in Europe on July 1, 2020. Even though united data were published at the state level, there is no data by region or city, so the interpretation of the COVID-19 epidemic in Serbia at the regional level is difficult.

Methods: This study uses public data from the Institute of Public Health and the Public Utility Company “Čistoća” in Novi Pazar to estimate excess mortality, i.e. difference between observed and expected deaths) in Novi Pazar in July 2020, during the COVID-19 pandemic. We looked at the differences between the total numbers of deaths in July 2020 and compared that to deaths in the same month the previous 5 years.

Results: As of 1 of July 2020, Novi Pazar had 300% higher mortality per 100 000 population compared to the same month last year, and almost ten times higher mortality than the rest of Serbia. Novi Pazar in the second week of July had the highest mortality peak of 457%. With this excess mortality rate, Novi Pazar had the highest peak excess mortality in Europe, after Bergamo, Italy.

Conclusion: Considering the challenges posed by using reported COVID-19 data, excess mortality is considered a more weak health information objective. However, these data show excess mortality in Novi Pazar and comparable measures that accounts for both the direct and indirect impacts of the pandemic.

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Peculiarities in Management of COPD Patients During the COVID-19 Pandemic in Serbia

Milan Radović^{1,2}

The COVID-19 pandemic has made routine management and diagnosis of chronic obstructive pulmonary disease (COPD) more difficult as a result of reductions in face-to-face consultations, difficulties in performing pulmonary function tests, and serious limitations in rehabilitation and home care programs. Prevalence of COPD is low in COVID-19 but associated with poor outcomes and substantial mortality in severe infection. Increased severity may be due to the upregulation of ACE2 in lower airways with active smoking and COPD. Ways to distinguish early COVID-19-related viral dyspnea from an acute COPD exacerbation (AECOPD) include the coexistence of flu-like symptoms not typically seen with COPD flare-ups, such as fever, anorexia, myalgia, and gastrointestinal symptoms. Management of COPD with COVID-19 according to GOLD guidelines, assumes standard treatment with antimicrobial agents and corticosteroids, though limiting the dose and duration of steroids use may be warranted due to the risk of increased viral shedding. Corticosteroids are beneficial to patients with a severe AECOPD, especially those requiring ventilatory support, in whom steroids reduce ventilation days and NIV failure. COPD patients who were survived severe forms of COVID-19 should be considered in high risk for developing a „critical illness“ or „chronic critical illness“ - a severe clinical syndromes linked not only to the acute infectious episode but also to the underlying conditions and concomitant diseases before they became severely ill.

Patients with COPD do not seem to be at greatly increased risk of infection with SARS-CoV-2, but are at an increased risk of hospitalization for COVID-19 and may be at increased risk of developing severe disease and death.

Key words: COVID-19, COPD, risk factors, corticosteroids;

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COVID-19 and Pulmonary Aspergillosis CHC Zemun Experience

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Invasive aspergillosis develops in severely immunocompromised patients, but increasingly in the critically ill non-neutropenic host and patients on steroids. In the Internal medicine department during pandemic we treated 5 cases of pulmonary aspergillosis patients associated with COVID-19 (CAPA) out of intensive care units. There have been infrequent reports of CAPA in patients with acute COVID-19 and also after recovery from COVID-19. Here we present the case of a 42-year-old man with CAPA activated after severe SARS-CoV-2 infection without previous history of immunosuppression. Patient was treated in CHC Zvezdara in September 2021 y. for severe COVID-19. After hospital discharge he was treated by the neurology department CHC Zemun for neurological deficits with thrombolytic therapy with complete recovery. Complete spontaneous pneumothorax was diagnosed and he was transferred to the surgical department 13.10.2021. y for active thoracic drainage. Thoracic HRCT scan 13.10.2021. showed cavitary lesions 95x50 mm in the left lung and in the apical segment of the right lung 21x28 mm. Diffuse bilateral GGO in the lung were present. Control HRCT scan 19.11.2021 showed residual postinflammatory pneumatocele 38x24x16 mm in the left posterior basal lung segment with resolution of bilateral lung ground glass opacities. Control HRCT in January 2022. y was practically normal. Aspergillus was isolated from sputum. Patient was successfully treated for 8 weeks with antifungal therapy, antibiotics with complete radiographic resolution of the lung lesions.

Could getting Covid “save” your life? A Case Report of a Patient Who was Diagnosed with Chronic Lymphocytic Leukemia and Renal Cell Carcinoma While Being Treated for Covid Pneumonia

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A 54 year old male patient, Z.P. was admitted to the Covid hospital in Novi Sad on November 19th 2021. On admission he complained of high fever and lost sense of taste. Two days prior he was treated in the General hospital in Sremska Mitrovica for covid pneumonia but as he presented with a very high leukocyte count he was referred to the Covid hospital in Novi Sad for further treatment. He had gotten 3 doses of the Sinopharm vaccine.

The patient's chest X-ray has shown bilateral pneumonia, and his blood count showed hyper leukocytosis with lymphocytosis (Leucocytes 129.7x10⁹/l, lymphocytes 106.1x10⁹/l). He was treated with antibiotics, corticosteroids, Janus kinase inhibitors, oxygen therapy, etc. His peripheral blood smear showed lymphocytosis with Gumprecht shadows, which pointed to chronic lymphocytic leukemia (CLL) which was later confirmed with bone marrow biopsy. An ultrasound of the abdomen was performed to determine the stage of the disease, but it has shown an infiltrative mass, about 5 cm in diameter, in the left kidney's lower pole. So a CT scan was performed, and was concluded that it's most likely renal cell carcinoma (RCC). The attending urologist indicated an operative treatment. The patient had no complaints whatsoever, nor clinical signs for CLL nor RCC.

Whilst CLL is an indolent disease, most often diagnosed while conducting routine blood work, and in most cases does not require prompt hematological treatment, the question being here, in the case of RCC, if it wasn't for Covid pneumonia, would it have been caught on time?

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Role Of Chest X-Ray in Outpatient Management of COVID-19 Patients

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Background: Chest X-ray is widely available in physician offices. Respiratory tract is the main site of pathological events in COVID-19. Because of that chest X-ray could be used for evaluation and follow up of COVID-19 patients.

Aim of the study was to investigate chest X-ray findings and their changes detected in COVID-19 outpatients.

Methods: Retrospective study of patients with virology confirmation of COVID-19 treated in Community Health Center of Novi Sad between January and May 2020. We have analyzed type, frequency and changes of chest X-ray findings over a follow up period of three months.

Results: A total of 102 patients were eligible for the study, 55 (53.9%) males and 47 (46.1%) females. The average age was 50.1 years for men and 60.1 years for women ($p = 0.006$). The most common chest X-ray finding was Ground Glass Opacity in 97 (95.1%) patients. In most of the patients 45 (44.3%) the first chest X-ray changes are noticeable in a range of 5 to 9 days after diagnosis was determined. Almost all patients (98.9%) had complete radiological regression up to 3 months after diagnosis was made.

Conclusions: Multifocal peripheral ground glass opacity are typical chest X-ray findings in COVID-19 outpatients. Pathological chest X-ray findings occur during the first week of the disease, which is why chest X-rays play a very important role in the early diagnosis in highly suspected patients. Control chest x-ray, as part of patient follow-up, should be performed 2-3 months after clinical improvement.

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Significant Comorbidities on Patients with COVID-19 – A Case Report

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Stefan Simovic^{1,6}, Djordje Stevanovic⁶, Vuk Jokovic⁷

Background: During pandemy of coronavirus disease 2019 (COVID-19) we become aware of COVID-19 severity, especially in patients with specific underlying comorbidities, such as obesity. Furthermore, obstructive sleep apnoea (OSA), deeply interrelated with obesity, is highly involved in the development of severe COVID-19 disease.

Case report: A 45-year-old obese male with COVID-19 was admitted in intensive care unit with signs of acute respiratory failure requiring high-flow nasal oxygenation (HFNO). Laboratory results showed increased proinflammatory and prothrombotic markers, followed by bilateral consolidations and ground-glass opacifications on chest X-ray, dilated right ventricle and increased right ventricular systolic pressure on transthoracic echocardiography, and multiple segmental and subsegmental filling defects on computed tomography pulmo-angiography. Our patient was hospitalized for 24 days and treated with HFNO, antibiotic therapy, low molecular-weight heparin, and corticosteroids. Interestingly, after recovery and discharge. he was diagnosed with severe form of OSA (Apnoea-Hypopnoea Index: 66.3; minimal oxygen saturation was 62%) and increased visceral fat on body density scan, which required positive airway pressure treatment during sleep and advised hygiene and dietetic measures.

Conclusion: It is important to notice that one study reported OSA was markedly related with COVID-19 adverse outcomes. Although there is still no robust evidence linking OSA and obesity as important predictors of higher pulmonary embolism risk in acute COVID-19 patients, with this case we wanted to alert the physicians on these comorbidities, which could probably be responsible for worse COVID-19 clinical presentation.

Note: The results of this abstract were included in the manuscript entitled "Obesity and sleep apnea as a significant comorbidities in COVID-19 – A case report", published in Obesity Research & Clinical Practice in April 2021.

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Mental Health of Medical Personnel During The COVID-19 In Serbia

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Background: To explore the mental health status of medical personnel in Serbia during the coronavirus disease 2019 (COVID-19) pandemic by measuring stress levels and symptoms of anxiety, and depression.

Methods: This cross-sectional study was conducted as an online-based survey, in the period from April 8 to April 14, 2020, during the COVID-19 pandemic. The study included 1678 participants, and the snowball sampling technique was used to reach health care professionals. The level of stress and symptoms of depression and anxiety were assessed among medical personnel in Serbia by the 10-item Perceived Stress Scale (PSS), the Beck Depression Inventory (BDI), the 7-item Generalized Anxiety Disorder scale (GAD-7), respectively.

Results: A total of 1678 participants completed the survey, with a mean age of 40.38 ± 10.32 years, of which 1315 (78.4%) were women, and 363 (21.6%) were men. 684 (40.8%) participants were medical personnel, and 994 (59.2%) were people of other professions. Frontline medical personnel reported higher scores on all measurement tools than second-line medical personnel (e.g. mean PSS scores 19.12 ± 5.66 vs 17.53 ± 5.71 ; $p=0.006$; mean GAD-7 scale scores 8.57 ± 6.26 vs 6.73 ± 5.76 ; $p=0.001$; mean BDI scores 9.25 ± 8.26 vs 7.36 ± 7.28 ; $p=0.006$). Binary logistic regression showed that the probability of developing anxiety symptoms doubles in medical personnel who took care of patients with COVID-19.

Conclusion: Our findings suggest that frontline medical personnel was under an increased psychological burden during the COVID-19 pandemic. Adequate measures should be taken to relieve that burden and preserve the mental health of frontline medical personnel.

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Vitamin D Status in Patients with COVID-19

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Background: Numerous data from literature show that in patients with COVID 19, vitamin D deficiency is associated with significant and serious clinical outcomes. As the COVID-19 pandemic leaves significant medical and social consequences world-wide, the aim of our study was to compare serum vitamin D concentrations in patients with COVID 19 with a control group of healthy subjects.

Methods: The study included 498 subjects, with the experimental group consisting of 249 patients diagnosed with COVID-19. The control group consisted of 249 healthy subjects. Serum concentrations of vitamin D (25 (OH) D3) were established in all subjects by the electrochemiluminescence method on the Cobas e 411 apparatus, Roche Diagnostics, Mannheim, Germany. For the statistical analysis of the obtained data, the Independent samples T test was used to assess the significance of the difference, whereas the bivariate correlation test was used to examine the correlation between the examined variables.

Results: Based on Independent samples T test ($t(496) = -24.852$; $p = 0.000$) patients with COVID 19 had statistically significantly lower serum vitamin D concentrations ($16.84 \text{ ng/mL} \pm 5.82$) compared to the control group of healthy subjects ($29.01 \text{ ng/mL} \pm 5.06$). Based on the correlation analysis, a significant negative correlation of vitamin D concentration with age was established in patients with COVID-19, Pearson's correlation coefficient $r = -0.262$, $p < 0.001$. Conclusion: The results of our study showed that patients with COVID 19 have vitamin D deficiency, a decrease in its concentration with age and the need to introduce adequate substitution.

Key words: COVID-19, vitamin D, Sars-CoV-2, laboratory diagnostics

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Pulmonary Thromboembolism in COVID-19: More Common in Elderly Patients or Not?

Katarina Stefanovic¹, Bojana Stefanovic¹

Background: Previous clinical experience and studies have shown that pulmonary thromboembolism is a very common complication of COVID-19. The aim of this study is to show whether pulmonary thromboembolism is more common in hospitalized patients older than 65 years.

Methods: The group of respondents consisted of 80 consecutive patients, 37 patients aged 65 or older and 43 patients younger than 65 who were admitted to hospital for COVID-19 at the Zvezdara Clinical Hospital in the second week of March 2021. Gender, age and frequency of pulmonary thromboembolism were examined from the parameters.

Results: In this retrospective study, 80 consecutive patients, 37 patients older than 65 years, and 43 patients younger than 65 years who were hospitalized for COVID-19 were examined. The average age of younger patients was 51 years, while the average age of elderly patients was 77 years old. The incidence of PTE in persons younger than 65 years is 4.6%, while the incidence of PTE in the elderly is 13.5%. A t-test was performed and a value of $p = 0.26$ was obtained.

Conclusion: The obtained results indicated that there was no statistically significant difference in the incidence of pulmonary thromboembolism in the group of hospitalized patients with COVID-19 older than 65 years compared to the population younger than 65 years.

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Liver Resection and Splenectomy Due to Associated Infarction in a Patient with Severe COVID-19 - A Case Report.

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Background: Coronavirus disease (COVID-19) represents the biggest health care challenge in the recent past as well as in the present. While lung complications are well known, an increased tendency towards thrombotic events are associated with worsen prognosis. Browsing the published literature, there are several reports about pulmonary embolism associated with SARS-CoV-2 however limited data can be found about visceral ischemic conditions. To date, there are neither published data on associated ischemic conditions of the liver parenchyma and spleen caused by COVID-19, nor the reports about their surgical management.

Case Presentation: A 47-year old female patient was admitted to the hospital after a 4-day episode of fatigue, cough, and high fever. PCR test for SARS-CoV-2 was confirmed positive. Chest x-ray showed bilobar pneumonia. After the 14-day treatment, the patient's general condition had significantly improved and the patient was discharged. Two days after discharge, the patient was readmitted to the surgical clinic due to severe abdominal pain. Abdominal MDCT demonstrated infarct lesion of the spleen and IVa liver segment. Despite conservative treatment, symptoms deterioration continues and repeated abdominal MDCT demonstrated splenic abscess. Splenectomy and resection of IVa liver segment were performed. The patient was discharged without any clinical signs of the disease on the postoperative day 7.

Conclusion: At the time of the current pandemic, medical workers should pay more attention to visceral thromboembolic complications; abdominal pain should be thoroughly examined by radiologists and surgeons, because of an early detection and the treatment of infarct lesions.

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Occurrence of Encephalopathy Within COVID-19 in Patients Over 75 Years Old

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Background: SARS CoV-2 is responsible for the pandemic of Coronavirus disease in 2019. By using its S protein, the virus attaches to the human ACE2 receptor and in that way infects a cell. Clinical manifestation generally shows the domination of respiratory symptoms, but also difficulties in connection to the gastrointestinal and central nervous system. Encephalopathy is characterized by diffuse brain dysfunction, typically manifested in changes of consciousness ranging from confusion, delirium, even deep coma, and clinical manifestations like seizures, headaches, or extrapyramidal signs.

Discussion: In this series of cases, we describe five patients with encephalopathy as part of SARS-CoV-2 infection, who were hospitalized in the last 3 months at Covid Hospital.

It was observed that these cases, although representing a heterogeneous group of individuals, most were men over 75 years of age who had significantly lower oxygen saturation levels, higher blood urea and creatinine levels, higher levels of inflammatory markers, including interleukin 6 levels (IL- 6) and D-dimers, higher rates of intubation and intensive care, higher mortality rates and reduced home discharge rates. Having an insight into several large studies, as well as in a series of cases, it was noticed that one in nine patients develops toxic metabolic encephalopathy and that with those patients the risk of death is 24% higher.

Conclusions: The main question remains whether delirium in COVID-19 cases is the primary manifestation of virus invasion of the brain or simply secondary encephalopathy caused by inflammation or other systemic effects of the virus.

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Glutathione Transferase Omega 1, Omega 2 and Angiotensin Converting Enzyme-2 Polymorphisms Affect the Susceptibility of COVID-19 Development

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Background: Based on the close relationship between dysregulation of redox homeostasis and immune response in severe acute respiratory syndrome coronavirus (SARS-CoV-2) infection, we speculated that polymorphism of the glutathione transferase omega 1 (GSTO1) and omega 2 (GSTO2), together with angiotensin converting enzyme-2 (ACE-2) might modulate individual susceptibility towards development of clinical manifestations in COVID-19.

Methods: Single nucleotide polymorphisms in GST omega (GSTO1rs4925, GSTO2 rs156697) and ACE2 (rs4646116) were determined by quantitative polymerase chain reaction (qPCR) in 255 COVID-19 patients and 236 respective controls.

Results: The obtained data have shown that carriers of variant GSTO1*AA and variant GSTO2*GG genotypes exhibit higher odds of COVID-19 development, contrary to the ones carrying referent alleles ($p=0.044$, $p=0.002$, respectively). These findings are confirmed by the haplotype analysis. Carriers of GSTO1*A and GSTO2*G variant alleles (H2 haplotype) were at 2-fold increased risk of COVID-19 development ($p=0.002$). Although ACE2 (rs4646116) polymorphism did not exhibit statistically significant effect on COVID-19 risk ($p=0.100$), the risk of COVID-19 development gradually increased with the presence of each additional risk-associated genotype.

Conclusions: Further studies are needed to clarify the specific roles of glutathione transferase omega in innate immune response and vitamin C homeostasis once the SARS CoV-2 infection is initiated in the host cell.

Keywords: oxidative stress; COVID-19; glutathione transferase omega; ACE2; polymorphisms.

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COVID-19 and Comorbidities

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Background: Clinical Center Kragujevac is a regional clinical center that cares for patients from Central and Western Serbia, 2 millions people. The number of hospitalized COVID19 patients in the Clinical Center Kragujevac varies depending on the pandemic wave. Comorbidities have a significant impact on the outcome of hospitalization COVID19 patients.

Aim: Analysis of frequency and significance of comorbidities on COVID19 hospitalization outcome.

Method - A retrospective cohort study that included all patients hospitalized at the Clinical Center Kragujevac with COVID19 discharge diagnosis. The hospital database Covid patients was described and the Charlson Comorbidity Index was used to measure the severity of comorbidity.

Results - 2/3 of hospitalized patients were males. The largest number of hospitalized patients live in Kragujevac. During hospitalization, 17.9% of patients died, who were on average 10 years older ($p < 0.01$), and stayed in the hospital about 2 days shorter ($p < 0.01$) when compared to discharged patients. 4/5 hospitalized patients had comorbidities. The overall prevalence of comorbidities was different in discharged and deceased patients ($p < 0.05$). According to the CCI, the most common comorbidities in hospitalized patients were: Diabetes without chronic complications (13.2%), Chronic lung disease (8.2%) and Kidney disease (7.8%). CCI score in-hospital death was significantly higher (0.48 ± 1.06 vs 0.69 ± 1.24 , $p < 0.05$).

Conclusion – COVID-19 patients who have comorbidities are more likely to develop a more severe course and progression of the disease, specially older patients. Patients with comorbidities should take all necessary precautions to avoid getting COVID19 infected, because they have the worst prognosis.

Keywords: COVID19, comorbidities, CCI index, in hospital death

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The Role of Molnupiravir in Reducing Risk of Hospitalization in COVID-19

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Background: New antiviral therapies have brought hope that we will be more successful in COVID-19 treatment. Aim of this study was to investigate the risk of hospitalization in a group of COVID-19 patients treated with molnupiravir and a group of patients not treated with antiviral therapy.

Methods: A cross-sectional study was conducted at the Covid Clinic of the Health Center „Novi Sad“. Data were collected during January 2022 for the patients treated with laboratory proven COVID-19 and at least one risk factor for development of severe illness from COVID-19, who received the antiviral therapy molnupiravir (800mg) twice-daily for 5 days and for patients who did not received the antiviral therapy.

Results: A total of 1011 patients were enrolled in the study, 491 males (48.6%) and 520 (51.4%) females. The average age was 61.3 years for men and 60.6 for women. There were 327 (32.3%) unvaccinated patients. There were 906 (89.6%) patients with at least one comorbidity. The percentage of participants who were hospitalized or died is lower in the molnupiravir group compared to patients who were not treated with molnupiravir (2.8% vs 6.5%, $p=0.001$). There were 36 (7.4%) non-hospitalized patients in molnupiravir group with pneumonia compared to 56 (11.7%) in the group of patients who were not treated with molnupiravir ($p=0.024$). Adverse events were reported in 8 (1.4%) patients treated with molnupiravir.

Conclusions: Molnupiravir reduced the risk of hospitalization or death for adult patients with COVID-19 when used within five days of onset of symptoms.

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Diagnosis of Central and Peripheral Neurological Manifestations in COVID-19

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Background. COVID-19 is most typically found in the respiratory system, but it has also been detected in neural tissues in several experimental studies and case reports. Various neurological anomalies have been reported in patients who tested positive for SARS-CoV-2, impacting both the central and peripheral nervous systems. In general, COVID-19 patients develop neurological problems between 1 and 14 days after infection, with most instances occurring on the 5th day of the incubation period. This paper aimed to present the neurological manifestations in COVID-19 patients with special emphasis on the most common symptom, as well as one of the most serious entities.

Methods. The study was observational, prospective, case-series. It took place at the Clinic for Infectious Diseases and Radiology Department, University Clinical Center Kragujevac, from 01.01.2021. to 01.02.2022. The study included all patients who had any of the central or peripheral neurological manifestations, confirmed COVID-19 by PCR/antigenic method and initial examination of the patients in the first 2 weeks since the occurrence of the first symptoms.

Results. The study included 300 patients with neurological symptoms. Headache was the most common manifestation, and incidence was 82%. The most serious complication was acute stroke with a frequency of 1.84%, with ischemic stroke being more common than hemorrhagic stroke.

Conclusions. Patients with a history of neurological problems have shown a higher chance of experiencing the neurological manifestation due to COVID-19. COVID-19 patients who developed neurological manifestations had an increased risk of death.

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Two Cases of COVID-19 Isolated Abducens Nerve Palsy - Case Report

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Background: We present one of the relatively rare COVID-19 complication-isolated unilateral abducens nerve palsy.

Methods: Two patients with COVID-19 were admitted at Clinical Hospital Center "Dr Dragiša Mišović-Dedinje" during March 2021. They were diagnosed as COVID-19 based on positive PCR testing. CT scans of the lungs were performed and bilateral pneumonia was diagnosed in both cases. Standard laboratory testing and CT scans of their heads were performed. Patients were treated in accordance with the National Guidance.

Results: A 41-year-old male patient with no previous relevant medical history, presented with fever, cough and fatigue. Two days later he developed acute, binocular, horizontal diplopia. Ocular motility examination revealed a paresis of the right lateral rectus muscle, with no other neurological defects. CT scan of the head was normal. Spontaneous recovery of abducens palsy occurred within two weeks.

Previously healthy 62-year-old female developed fever, cough, fatigue and shortness of breath. Three days later she reported binocular, horizontal diplopia. After neurological examination she was diagnosed with isolated left abducens nerve palsy. CT scan of the head was normal. This was resolved spontaneously after four weeks.

Conclusions: To date, there are few case reports describing isolated abducens nerve palsy during COVID-19. In patients with isolated cranial nerve palsy, COVID-19 presented with different symptoms and severity. Most of the cases spontaneously recovered. Possible mechanisms related to nerve damage in SARS CoV 2 infection are still unknown. Previous research suggests that symptoms may occur due to viral invasion, aberrant immune response or vascular disturbances.

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Fungal Infection in Patients With COVID-19 Treated in Clinic For Infectious and Tropical Disease

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Katarina Banovic¹, Biljana Nikolic¹, Snezana Jovanovic¹

Background: Patients with COVID-19, especially severely ill or immunocompromised, have a higher probability to develop invasive mycoses (IM). Timely and appropriate mycological diagnostics (MD) is a crucial determinant of survival in patients with IM.

Methods: In this retrospective study we analyze nonculture and mycological culture (MC) methods at the Department of Medical Microbiology, University Clinical Center of Serbia (UCCS) in patients with COVID-19 from Clinic for Infectious and Tropical Disease (CITD) in the period from March 2020 to February 2022. We analyzed 329 samples (322 serum, 3 blood, 4 bronchial aspirates), obtained from 81 patients hospitalized in CITD. We performed the following non culture assays: (1,3)- β -D-glucan, FUJIFILM (n=10 patients), Aspergillus galactomannan Antigen (AGA), Dynamiker Aspergillus Galactomannan Assay (n=87), Anti Aspergillus IgM and IgG, TECAN (n=87), Candida mannan Antigen (CMA), Dynamiker Candida mannan Assay (n=51), Anti Candida IgM and IgG, Nova Lisa (n=34). The results were interpreted according to the manufacturer's instructions.

Results: AGA were detected in 4 (4.6%) and CMA in 20 (32.3%) patients. Anti-Aspergillus IgM, IgG or both antibodies were detected in 7.8%, 23.5% and 29.4%, respectively. All tested samples were negative for: (1,3)- β -D-glucan, Anti-Candida IgM and IgG antibodies. Seventeen point seven percent of patients had positive CMA and negative MC; 8.0% patients had positive MC and negative CMA and 14.5% patients had positive results in both.

Conclusions: In order to increase likelihood to identify patients with IM, it is necessary to use both nonculture and conventional MD simultaneously, and the obtained results should be carefully, multidisciplinary interpreted.

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Examination of Severe COVID-19 Pneumonia: Association Between Serum Interleukin-6 Levels and Fear of Unfavorable Outcome

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Background. The scoring system in lung radiography of COVID-19 suspected patients, proved to be an excellent predictor of positivity and accelerated mortality. Interleukin-6 is known to be an independent predictor of in-hospital mortality and we have observed in clinical practice that a large number of patients with this outcome exhibit fear of COVID-19. Objective was to examine the radiological characteristics of COVID-19 and the correlation between fear of unfavorable outcomes in COVID-19 and IL-6 levels, which hasn't been published in the world literature so far.

Methods. The study was observational, prospective, case-series. It took place at the Clinic for Infectious Diseases and Radiology Department, University Clinical Center Kragujevac, from 1-1-2021 to 1-2-2022. Inclusion criteria: confirmed COVID-19 by PCR/antigenic method; initial and control lung radiographs; measured fear of death with the Visual-analogue-scale and the finding of severe pneumonia (dyspnea, SpO₂ ≤ 93%, and lung infiltration in >50% parenchyma).

Results. A total of 350 patients were examined. The mean age of the patients was 59.9 ± 13.5. The mean value of IL-6 was 36.05 (3.95–160.00) pg/mL. The correlation study showed a positive relationship ($r = 0.530$) between the radiographic findings and the IL-6 values, as well as in fear of death/IL-6 level ($r=0.734$).

Conclusions. Our study showed a positive correlation between elevated IL-6 levels and highly expressed fear of death in severe COVID-19 pneumonia, which may be useful in the treatment, because it indicates that psychological support and early immunoglobulin administration, may prevent worsening of lung parenchymal damage and improve prognosis.

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Histopathological Findings in Autopsies of Early Post-Covid Patients: Two Case Reports

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Background: The scientific evidence concerning pathogenesis and histopathological findings in patients who have died of acute coronavirus disease 2019 (COVID-19) is rapidly evolving in the literature. However, the findings of patients who have survived the acute phase of COVID-19 are insufficient. We evaluated the different tissues obtained by autopsies of two patients who have been previously hospitalized and treated for 3-4 weeks as per current COVID-19 treatment protocol and discharged.

Methods: We performed full body autopsies of two patients after the postmortem nasopharyngeal swab PCR test results were negative. Detailed gross examination of all internal organs was done, and representative tissue samples have been collected for histopathologic analysis, which have been routinely processed (formalin fixation, paraffin embedding, 4-5 µm cut slides, hematoxylin-eosin staining).

Results: In both cases the main histopathologic findings were observed in lung parenchyma with diffuse alveolar damage in late phase (i.e., organizing stage) with superimposed purulent bronchopneumonia and invasive type of fungal infection. Detected fungus morphologically corresponds to the *Aspergillus* species. In one case complicated disseminated aspergillosis was detected, while in other cases lung aspergillosis and acute infective endocarditis with systemic embolic events were present.

Conclusions: Our observations in post-covid patients suggest that beside the direct cytopathogenic effect of Corona virus in the early phase of COVID-19 diseases, an aspergillosis as a late complication of treated patients could be expected.

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How to Treat Lung Cancer Patients in the COVID-19 Pandemic – Recommendations

Marina Cekic¹

Background: COVID-19 has burdened the global health system, leading to a modification of patient care and unprecedented access to health services. During this pandemic, maintaining cancer care was a challenge that required careful risk weighing of COVID-19 and optimal oncology standards.

Methods: Following WHO indications, developing a framework to provide clear guidance on health care priorities was needed, to support and facilitate decision-making when resources need to be rationalized and carefully allocated. Any possible modification of the treatment schedule should involve multidimensional assessment tailored to local resources, including clinical and tumor characteristics, therapeutic goal, and potential risks associated with COVID-19.

Results: Patients with lung cancer are at higher risk of developing COVID-19, which will also put them at higher risk of comorbidity or mortality.

ESMO Clinical Guidelines for Lung Cancer Management is a guide to ensuring and maintaining high quality standards for lung cancer patients. The guidelines recommend that the clinical situation and quality of care for patients with lung cancer does not change, so all treatment plans should be discussed with a multidisciplinary team, and the implementation of a multidisciplinary team should be considered in light of the COVID-19 Pandemic and its challenges.

Conclusions: ESMO recommendations should serve as a guideline for clinicians to ensure and maintain optimal standards of treatment for patients with lung cancer during a pandemic.

Key words: COVID 19, lung cancer, treatments, recommendations

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Comparison of Two Different Real-Time PCR Protocols for SARS-CoV-2 Detection in Department of Medical Microbiology - University Clinical Center of Serbia

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Background: In this study, we compared the range of cycle threshold (Ct) values of two real-time (RT) PCRs for SARS-CoV-2 detection: BGI RT-PCR using Sanli Medical Virus Transport Medium (SMVT) and Bio-Speed SARS-CoV-2 Double Gene RT-PCR (Bio-speed) using vNAT transport medium.

Methods: The study was performed in the National Laboratory "Fire Eye", University Clinical Center of Serbia. Nasopharyngeal swabs were used as samples in SMVT (n=564) and vNAT transfer medium (n=691). With both RT-PCR seventeen samples were tested. Extraction nucleic acid for BGI RT-PCR was performed using MGISP-960 and RT-PCR Bioer LineGene 9600 Plus (40 cycles). The Bio-speedy protocol includes extraction of nucleic acids in vNAT transport medium and amplification on Bio-Rad CFX96 RT-PCR machine (35 cycles). Ct values are interpreted according to recommended protocol. Both protocols are used to detect ORF gene of SARS-CoV-2, while Bio-Speedy additionally reveals N gene. To compare the tests Ct value, we used the Student's t-test (with 95% confidence interval).

Results: Of the samples tested on Bio-speed 148 (21.42%) were positive (average Ct: 25.88±6.1), while on BGI RT-PCR there were 204 (36.17%) positive (average Ct: 25.74±5.7). Among simultaneously tested samples, 7/17 (41.18%) were positive on both, with average Ct for Bio-speedy (32.57±1.39) and BGI (31.07±3.57). Ten samples were negative on both RT-PCR. There is no statistically significant difference (p=0.919) between the Ct values of the two RT-PCRs.

Conclusion: Both RT-PCRs showed reliability, applicability, and high specificity for SARS-CoV-2 detection. The advantage of Bio-Speed is three times faster result acquisition.

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Endoscopic Finding of Intestinal Graft-Versus-Host Disease – A Case Report

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Background: Intestinal graft-versus-host disease (GVHD) is a complication of allogeneic stem cell transplantation (SCT) with an incidence of about 10% and a mortality rate of 10% to 30%. Symptoms include frequent diarrhea, abdominal pain, and gastrointestinal bleeding. The diagnostic method of choice is endoscopy with biopsies.

Case report: A 32-year-old male had been treated for splenic T-cell lymphoma since March 2019. In January of 2021, allogeneic SCT was performed, and graft acceptance was confirmed. A few months later, the patient reported fever and frequent diarrheal stools with admixtures of blood, so he was hospitalized. Early GVHD was suspected, so corticosteroid therapy was introduced. Due to a positive test for COVID-19, he was transferred to our hospital for further treatment. On admission, the patient was adynamic with palpably painful-sensitive abdomen. The dose of corticosteroid therapy was increased to 2mg/kg with the introduction of cyclosporine A. Additionally, lower endoscopy was performed, hematinized liquid contents were seen in the colon and whitish plaques along the entire visible intestine from which the biopsy was taken. Pathohistological findings indicated first-degree intestinal GVHD. Budesonide was introduced in the therapy, and the bleeding had stopped. In the further course, there was a progression of the underlying disease which resulted in a fatal outcome.

Conclusion: After allogeneic SCT, in the case of frequent, diarrheal stools with blood impurities, intestinal GVHD should be suspected. Bearing in mind that appropriate therapy for intestinal GVHD is immunosuppressive, it is necessary to rule out infectious colitis in order to avoid worsening of an unrecognized intestinal infection.

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Inflammatory Bowel Disease Patients Hospitalized Due to COVID-19

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Igor Pančevski³, Marija Zdravković^{1,2}

Background: It is still unclear whether COVID-19 patients with inflammatory bowel disease (IBD) who also suffer from other comorbidities end up having a worse disease course.

Methods: This was a retrospective, single-center study conducted at the UHMC Bežanijska kosa, based on 18 IBD patients hospitalized from July 2020. until October 2021, who were COVID-19 positive. The database included: patients' age, gender, value of CRP and CT scan severity score of interstitial pneumonia, and comorbidities (arterial hypertension, atrial fibrillation, diabetes mellitus type 2 and malignancy).

Results: There were 16 patients with ulcerative colitis and only two with Crohn's disease. The youngest patient was 20, the oldest was 90 years old. There was 8 male and 10 female patients. As well, 11 patients had interstitial pneumonia, and the lowest CT scan severity score was 5, while the highest was 17. The lowest value of CRP on admission was 0.6mg/L, the highest was 492mg/L. Additional comorbidities were recognized in 7 patients. There was no statistically significant difference in the value of the CRP and the CT scan severity score on admission between COVID-19 infected IBD patients with and without additional comorbidities ($p=0.268$, $p=0.668$, respectively).

Conclusion: According to this study, over the course of one year, only 18 out of 3320 total hospitalized COVID-19 patients were known to be suffering from IBD. This indicates that this group of patients was not exposed to an increased risk of getting a severe form of COVID-19. The disease course remained unaffected by the additional comorbidities those patients were suffering from.

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Inflammatory Markers, Lipids And other Cardiovascular Risk Factors During COVID-19 In Diabetes

Sandra Singh Lukač¹

Background: Many patients with COVID-19 have associated comorbidities. Hypertension is reported in about one-fifth of the patients, followed by diabetes in 9.7% and CVD in 8.4%. In addition, patients with underlying comorbidity have more severe infections and worse clinical outcomes with higher case fatality rates.

Methods: Literature review of risk factors associated with COVID -19 in diabetes patients.

Results: Severe SARS CoV-1 infection has been associated with prolonged hyperglycemia in people without pre-existing diabetes. Potential direct β -cell damage caused by SARS-CoV-2 might lead to insulin deficiency and worsening of hyperglycemia. Hyperglycemia promotes the synthesis and release of proinflammatory cytokines, leading to oxidative stress, which mediates tissue inflammation with higher propensity to infection and worse outcomes. In T2DM, the inflammatory response is enhanced and an imbalance between coagulation and fibrinolysis takes place, with increased levels of clotting factors and endothelial dysfunction. Vascular inflammation and endothelial dysfunction are parts of other co-existing chronic conditions, namely hypertension and CVD. In addition, obesity as well is an important comorbidity that is associated with an increase in the prevalence, severity and mortality of COVID-19. In patients with T2DM, dyslipidemia is present in 30–60% of cases and is characterized by elevated triglyceride, moderately elevated dense LDL and low HDL levels. Smaller but dense LDL particles form which are more atherogenic, promoting a prothrombogenic state. Triglycerides also deposit in peripheral tissues and lead to insulin resistance.

Conclusion: There is currently not sufficient evidence regarding the most appropriate management of CVD risk in patients with diabetes during COVID-19. Personalized therapeutic strategies and optimal glucose control should be the main goal.

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Comprehensive HLA Analysis in Patients with COVID-19-Induced Large Vessel Giant Cell Arteritis

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Background: Giant cell arteritis (GCA) is an immune-mediated vasculitis affecting large arteries, and hypothetically, may be triggered by viruses. Human leukocyte antigens' (HLA)-DRB1*04 and HLADRB1*01 were considered as susceptibility, while HLA-DRB1*15 and HLA-DRB1*16 as protective alleles for GCA. We analysed HLA in two cases of large vessels (LV)-GCA which developed after COVID-19.

Case presentation: The first case, a 69-year-old male, had a mild COVID-19 three months before presenting with features of LV-GCA and increased inflammatory parameters (CRP 2847mg/dl, IL-6 802.3pg/ml). MDCT arteriography performed on two occasions, a few months apart, revealed migratory arteritis. HLA typing showed: HLA-A*2,-A*24;-B*51,-B*57;-DRB1*15,-DRB1*16;-DQB1*05,-DQB1*06; The second case, a 64-year-old female, also developed LV-GCA two months after a mild COVID-19, presenting with a high CRP (183mg/dl) and constitutional symptoms. Thickening of the ascending aorta and the aortic arch was noticed on MDCTA. Typing of HLA revealed: HLA-A*2,-A*11;-B*27,-B*35;-DRB1*14,-DRB1*15;-DQB1*05,-DQB1*06; A whole-body 18F-FDG-PET/CT in both cases revealed inflammation of the ascending, aortic arch, thoracic and abdominal aorta. Corticosteroids were given in both cases; due to a prolonged inflammatory state, the first patient received tocilizumab, leading to a significant improvement.

In conclusion, LV-GCA may be considered as an autoimmune manifestation triggered by SARS-CoV-2 infection, and may represent the clinical presentation of the post acute COVID-19. Notably, none of the HLA susceptibility alleles for GCA were detected in our patients. In contrast, both patients were HLA-DRB1*15, and one of them HLA-DRB1*15/DRB1*16 carriers, suggesting a possibility of losing their protective effect in LV-GCA triggered by SARS-CoV-2.

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Association Between COVID-19 with Lymphomas, Belgrade Experiences

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Background: Infection caused by the SARS COV 2 virus, in patients treated for lymphoproliferative diseases, requires a special treatment. The aim of our study was to analyze the demographic, laboratory and clinical characteristics of patients with lymphoma associated with the COVID-19 requiring hospital treatment.

Methods: Retrospective analysis included 95 patients (49 men, 46 women), 11 patients with MH and 84 patients with NHL, average age 60 years, hospitalized in three tertiary Covid centers in Belgrade from March 2020 till December 2021.

Results: In 53 (55.79%) patients the Covid-19 virus infection occurred in the phase of active treatment of lymphoma, while 31 patients were in remission, 4 patients were newly diagnosed and 7 patients were on the "Watch and Wait" regimen. Forty-six patients underwent IHT and 18 patients were subjected to high-dose HT. Comorbidity was present in 63 patients. Thirty-one patients had high CRP values (> 100 mg/L), elevated LDH, ferritin and D-dimer were found in 44, 79, 69 patients, respectively. In 17 patients, the elevated IL-6 value was above 50 ng/L. Among all hospitalized patients with lymphoma, 56 had a severe and very severe form and required oxygen support. Ten patients were subjected to immunotherapy with tocilizumab, whereas 73 patients received corticosteroids. There were 20 patients in the IUC. Fatal outcome was found in 19 (20%) patients. The average length of hospitalization was 12.67 days.

Conclusion: Mortality in our cohort was higher than in the general population, as expected, and slightly lower than in similar international studies.

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Autopsy Of Two Patients Previously Diagnosed with COVID-19

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Background: With 440 million acute coronavirus disease 2019 (COVID-19) cases and 5,9 million deaths worldwide, COVID-19 is one of the largest pandemics ever seen. Since the autopsy can provide a lot of useful information related to disease, it is one of the crucial diagnostic procedures that helps us to understand pathogenesis related to Coronavirus (CV).

Methods: We report two autopsy cases of patients previously diagnosed with COVID-19. Both patients were nasopharyngeal swab PCR test negative for CV at the moment of the autopsy procedure. Autopsy was performed according to standard procedures with adequate personal protective equipment. Representative tissue samples were collected, processed and histopathologically evaluated.

Results: Histopathological changes were mainly located in the heart and lungs. Both patients had diffuse alveolar damage (DAD), severe lung edema and thrombi presented in small diameter pulmonary artery branches, associated with lung infarction and hemorrhage. One patient had myocarditis presented with focal necrosis of cardiomyocytes and interstitial inflammatory infiltrate composed of lymphocytes, plasma cells and scarce neutrophils. The other patient had myocardial microabscesses formed around bacterial colonies and microthrombi in small blood vessels. The same patient had microabscesses in kidneys and brain, subarachnoid hemorrhage and acute pancreatitis.

Conclusions: Based on these two cases, pathological findings related to COVID-19 were mainly presented in heart and lungs. DAD and microthrombi were common findings for both patients. Autopsy findings could bring some light on COVID-19 pathogenesis, therefore, such a practice should be continued.

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Acute Kidney Injury in Geriatric Patients After COVID-19 Treatment - Case Report

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In addition to corticosteroid and antiviral therapy, antibiotics are often prescribed during the treatment of patients with Covid 19 infection, especially in patients with respiratory insufficiency. Elderly patients often have one or more comorbidities, as well as some degree of chronic kidney disease. Antibiotic overuse is the major risk factor for *Clostridium difficile* infection with diarrheal syndrome, which due to dehydration can worsen the already reduced renal function.

Case Report: A 90-year-old patient is brought to the Emergency Center, with acidotic breathing and altered mental status, with information that he has had profuse diarrhea and decreased diuresis in the last few days. On admission patient had hypotension, tachypnea, metabolic acidosis, sCr 420 and CRP 145. Three weeks before the examination, the patient was discharged from the Covid Hospital with the advice to continue treatment with Cefixime for the next ten days. During hospitalization in the Clinic of Nephrology, the patient was treated with parenteral rehydration therapy, Metronidazole and Probiotic. Positive stool test for *C. difficile* GDH antigen and toxins was found and Vancomycin was added to the therapy. Recovery of renal function was achieved to a sCr value was 160 $\mu\text{mol/l}$, with cured diarrheal syndrome.

Conclusion: Acute kidney damage very often occurs in elderly in conditions of infection without adequate rehydration and with the use of nephrotoxic drugs. Dehydration due to various causes, and most often due to diarrhea, in this case caused by *Clostridium difficile* infection, further impairs renal function, which in the most severe cases requires dialysis treatment.

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Plasmapheresis in Covid Positive Patient with TTP Syndrome - Case Report

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Background. Plasmapheresis (PF) is a therapeutic procedure of plasma separation using a selectively permeable membrane. This procedure removes autoantibodies, free light chains of monoclonal immunoglobulins and other proteins that participate in the pathogenesis of the disease. Very often, relapses of these diseases are induced by viral infections. The nurse-technician conducts the procedure independently through the machine for PF and continuous procedures.

Case report. Patient 57-year-old was referred to hospital due to a confirmed COVID-19. She had problems in the form of weakness, fever and shivering for six days. She has already been treated with PF due to TTP, which developed as part of systemic lupus erythematosus. On admission, the patient is oriented, afebrile, without signs of respiratory insufficiency, but laboratory analyzes show thrombocytopenia of significant degree (platelets $9 \times 10^9/L$), with anemia, and almost immeasurable haptoglobin values. Since pulse doses of corticosteroids did not lead to a significant increase in the number of platelets (PLT), it was decided to start treatment with plasmapheresis. After five consecutive, daily PF procedures, a significant increase in PLT count was registered, and hemolysis was stopped with preserved renal function.

Conclusion. The patient's degree of thrombocytopenia was life-threatening. Since COVID-19 itself can lead to thrombocytopenia, PF administration could lead to a significant reduction in the patient's immune resistance, which would jeopardize recovery from COVID-19. On the other hand, it is known that proinflammatory cytokines play a significant role during the pathogenesis of covid infection, so plasmapheresis itself can act to eliminate non-specific proinflammatory cytokines.

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Continuous Renal Replacement Therapy among Patients with COVID-19 - Case Study

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Pneumonia and respiratory insufficiency are prevalent conditions among patients with severe and critical disease caused by COVID infection. Kidney disease is a common complication of COVID patients, especially those with critical COVID disease. Old age, hypertension, obesity and diabetes mellitus are independent risk factors for developing acute kidney disease among those patients. If conservative therapy does not succeed, a patient is subject to dialysis treatment. Continuous renal replacement therapy is a preferred method comparing to intermittent dialysis, with hemodynamically unstable patients. Hemoperfusion is conducted independently or hemoperfusion cartridges are implemented through continuous renal replacement therapy.

Case study: Patient age 67, was sent to Covid hospital due to pneumonia. The disease began seven days prior to admission, with symptoms of high temperature and coughing. At admission patient was conscious, SPO₂ 94% at 25l O₂, Ur 24,6 mmol/l, Cr 233 mmol/l, CRP 89.3, functional diuresis. Five days after the admission, signs of respiratory insufficiency were developed, patient was introduced to HIGH FLOW ventilation, and further patient was put on mechanic ventilation. Considering the development of anuria, sepsis (CRP 194mg/l, feritin > 40000ug/L) and hemodynamic instability, patient was given a continuous hemodiafiltration with hemoperfusion cartridge. After three CVVHDF treatments function was improved (Cr 202 mmol/l, CRP 62 mmol/l, diureza 8,2l/24h, feritin 15043.5ug/L).

Conclusion: During the treatment of patients with COVID-19 dialysis nurse plays a big role. A nurse has to be well educated, familiar with continuous renal replacement and therapy procedures.

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The Impact of COVID-19 Pandemic on Physical Activity - An International Rims-Sig Mobility Study

Una Nedeljkovic¹

Background: Physical activity is associated with a wide range of benefits for physical and mental health status in people with multiple sclerosis (PwMS). In the general population and in people living with disabilities there is emerging evidence that Covid-19 pandemic has negatively impacted physical activity behavior. Therefore, the Special Interest Group for Mobility (SIG Mobility) launched an international study which aimed to investigate whether and how physical activity may have changed during COVID-19 pandemic in PwMS.

Methods: A multi-centre international online survey study was conducted within 11 participating countries. Each country launched the survey using online platforms from May to July 2021. The survey ascertained physical activity performance and its intensity, the nature of the activities conducted and the use of technology to support home-based physical activity pre- and during the pandemic.

Results: The survey was completed by 3725 participants. Pre-pandemic, the majority (83%) of respondents reported being physically active, and this decreased to 75% during the pandemic. This change was significant for moderate and high intensity activity. Activities carried out in physiotherapy centers, gyms or pools decreased the most. Walking was the most frequently performed activity pre-pandemic (27%) and increased during the pandemic (33%).

Conclusion: Physical activity performance, especially activities at moderate and high intensities, decreased during the pandemic in PwMS compared to pre-pandemic gained popularity to stay active. A call for action to develop interventions focused on walking programs, with specific emphasis on increasing physical activity of persons with MS is proposed.

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Casirivimab/Imdevimab and Bamlanivimab in the Treatment of Patients with Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) – Real-Life Experience and the Review of Literature

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Background: During the last year different neutralising monoclonal antibodies were developed targeting the SARS-CoV-2 spike glycoprotein.

Methods: We analysed demographic characteristics, comorbidities and initial symptoms in patients with COVID 19 who received neutralising monoclonal antibodies (casirivimab/imdevimab or bamlanivimab), from October 2021 until February 2022, as well as their disease progression and outcome.

Results: In the defined time period 164 (76.6%), 49 (22.9) and 1 (0.5%) patients with COVID 19 received casirivimab/imdevimab, bamlanivimab, and sotrovimab, respectively. The mean age of patients was 58.7 ± 15.3 years (range from 19-92 years). All patients had comorbidity. Thirty-five (16.2%) patients had autoimmune disease while 60 (28.0%) had malignancy and 21 (35%) had disseminated disease. Forty-two (19.6%) patients received premorbid immunosuppressive therapy. The mean time of symptom onset was 2.88 ± 1.78 days prior to receiving neutralising antibodies. Thirty-one (14.5%) patients had pneumonia, and none required oxygen therapy at the time of the antibodies administration. Out of 214 patients, 38 (17.7%) required further hospitalisation due to the disease progression or comorbidity, 33 (13.7%) subsequently required corticosteroid therapy, one patient received baricitinib, and 17 (7.9%) received oxygen therapy for a mean of 7.5 ± 5.8 days (14 through standard oxygen mask, 1 through HFNC, and 2 required invasive mechanical ventilation). Three (1.4%) patients died, two of which due to COVID 19 pneumonia and one due to sudden cardiac arrest. One patient reported adverse effects (cough, dyspnea) during drug (casirivimab/imdevimab) administration.

Conclusion: Real-life experience with COVID 19 showed that neutralising monoclonal antibodies was a beneficial treatment for non-hospitalized vulnerable patient populations.

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Acute Chorioretinitis in Patients with Confirmed COVID-19

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Background: Recent data suggest that COVID-19, although rare, may be associated with chorio-retinal involvement.

Methods: we present three cases with acute chorioretinitis in outpatients with confirmed COVID-19. All patients underwent complete ophthalmologic examination included dilated fundus, optic coherence tomography (OCT), fundus autofluorescence (FAF) and fluorescein angiography (FA). Serological examinations were performed with the aim to exclude other "retinotoxic" viruses as a cause of chorioretinitis.

Results: one patient demonstrated punctate inner chorioretinitis in both eyes while two others demonstrated unilateral multifocal chorioretinitis. Main complaints were acute painless loss of vision. Fundoscopic examination revealed the presence of multiple discrete, slightly elevated yellow-whitish punctate or placoid lesions at the posterior eye pole. In the first subject, macula was involved, too. After conservative steroid treatment, morphological changes were resolved with no impact on central visual acuity.

Conclusion: it is well known that the eye is a potential port of SARS-Cov-2 virus entry but chorioretinal involvement in COVID-19 is extremely rare. Our report could alert colleagues on such associations.

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The Relations of Stressogenic Experience of Hospitalisation, Personality Structure and Current Emotional Status in the Hospitalised COVID-19 Patients

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Background: The studies indicate the correlation between Covid-19 related stress and negative indicators of mental health. On the other hand, reacting in stress situations is strongly correlated with basic personality structure.

Methods: The aim of this research is to determine the relation between stressogenic experience and current emotional states of depression, anxiety and distress of the hospitalised COVID-19 patients. The basic personality structure of the patients was measured to investigate its moderating effect on the relation between stressogenic experience of hospitalisation and negative affectivity. The Depression Anxiety Stress Scales-DASS-21 (J.D.Henry and J.R.Crawford,2005; Lovibond & Lovibond,1995), Brief HEXACO Inventory-BHI, (R.E de Vries,2013) and Personality Inventory DELTA-10 Form S (G.Knežević et al.,2017) was filled in by 267 COVID-19 patients of both genders, aged 18 to 82 years.

Results: The variables of patient's somatic status, radiology image of the lungs ($r=0.149$; $p<0.01$) and severity of clinical manifestation ($r=0.120$; $p<0.01$) are correlated with anxiety symptoms, but not with depressive symptoms and distress. We found that personality trait disintegration moderates the relation between the physicians' feedback to patients on their somatic states and anxiety. The disintegration moderates the relation between the information about radiological image of the lungs and anxiety (R-square increase due to interaction(s): $F(1,252)=5,81$; $p<0.02$). Disintegration also moderates the relation between the information of the severity of clinical manifestation and anxiety (R-square increase due to interaction(s): $F(1,252)=6,54$; $p<0.01$).

Conclusions: Information about the somatic status of the infected increases their level of anxiety. Dispositional characteristics of the patients can increase or decrease this influence.

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Retinal Vein Occlusion Associated with COVID-19

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Background: retinal vein occlusion (RVO) has been associated with a hypercoagulable state, which is commonly seen in COVID-19.

Method: We present two cases of unilateral RVO associated with confirmed COVID-19 and with no pneumonia. They underwent complete ophthalmological examination including fundus autofluorescence, optical coherence tomography and fluorescein angiography.

Results: Both cases were otherwise healthy middle-aged male who had complained of painless loss of vision. The first case demonstrated central retinal vein occlusion and the second, branch RVO. biochemical results were higher than referral in inflammatory (CRP) and hemostasis marker (D dimer)

Conclusion: The hypercoagulable state induced by COVID-19 may be linked with RVO

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Transcatheter Arterial Embolization of Spontaneous Muscle Hematoma in COVID-19 Patients

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Background: Spontaneous muscle hematoma (SMH) is a rare but severe complication in COVID-19 patients, associated with high mortality. Studies have shown a higher incidence of SMH in COVID-19 patients compared to the patients on anticoagulant therapy who were not infected with COVID-19.

Methods: We performed transcatheter arterial embolization (TAE) in 39 patients with SMH between January 1st 2021 and February 15th 2022. CT examination was used to diagnose SMH in patients with clinically suspected bleeding and a significant decrease in hemoglobin levels. Bleeding was observed in ileo-psoas, adductor magnus, gluteus, rectus abdominis, and pectoralis major muscles. TAE was performed no later than 3 hours after diagnostic confirmation. Hemostasis was achieved with superselective microcatheter embolization using embolization particles as well as coils. After the intervention, the patients were placed in intensive care units for further treatment.

Results: In 36 patients, no further decrease in hemoglobin levels was observed in the first 7 days after the procedure. Three patients died in the first 24 hours regardless of the technical success of the procedure.

Conclusion: Considering that the COVID 19 pandemic is still ongoing, it is of great significance to be aware of possible complications, as well as of effective therapeutic options for our patients. TAE is a minimally invasive, effective life-saving procedure.

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COVID-19 and Psychosis

- A Case Report

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Background: The SARS-Cov-2 virus has a multisystemic effect, including the CNS, and causes a wide range of psychiatric diseases (depression, anxiety, insomnia, cognitive impairment, psychosis).

Case report: A 36-year-old patient, divorced, without children, any previous psychiatric history, PS abuse, without somatic diseases. Increased stress due to a recent divorce. In November 2020, the first psychiatric examination was conducted due to behavioral changes. One week before admission, self-isolation instituted due to COVID-19 was terminated. She experienced milder symptoms: subfebrile fever, shortness of breath, loss of taste and smell. Lung X-ray was normal, laboratory analysis was characteristic for COVID-19. She was treated with antibiotics (azithromycin) and vitamin supplements. Mental disturbances in the form of paranoid-interpretive syndrome with a predominance of relationship delusions, persecution, special abilities, and erotomanic delusions impaired with low volition (hypobulia, insomnia, inactivity, uncritical behavior). Consciousness was intact. Treated with low doses of risperidone (2 mg p.d.) in addition to anxiolytics and hypnotics. After one week, partial reduction is noted, after two weeks complete clearance of mental disturbances. Treated with risperidone (1 mg p.d.) for another three months. Usage of anxiolytics and hypnotics was terminated. Due to concentration issues, vinpocetine was added. The patient currently functions at premorbid level.

Conclusion: This case illustrates the association of psychiatric symptoms with COVID-19. According to the characteristics, it was a “de novo” secondary (covid) psychosis, which is compatible with literature. Furthermore, prospective follow-up is needed to determine the true effect of COVID-19 on the occurrence of psychosis (new clinical entity or not).

Key words: Covid-19, psychosis, pandemic

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Neuropsychiatric Complications of COVID-19 - A Case Report

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Background: SARS-CoV-2 is a virus with multisystem action and can cause several neuropsychiatric disorders. Clinically proven neurological deficits lead to organic psychoses.

Case report: A 40-year-old patient, unemployed, married, mother of two. She was admitted at the Clinic for Psychiatry due to mental disorders manifested as depersonalization and derealization phenomena, mood swings, lethargy, anxiety, hypochondriac delusions, feelings of centeredness and existential endangerment, insomnia. In 2020, a month after passing COVID-19, she was treated at the Clinic for Neurology due to a crisis of consciousness, diagnosed with encephalitis, encephalopathy. Subsequently, cognitive-mnemonic deficits persisted. Afterwards, she completed a full recovery. In April 2021, after reinfection with the SARS-COV-2 virus, a depressive-interpretive syndrome developed, which is the reason for current hospitalization. The phenomena of depersonalization and derealization, temporal disorientation, hypochondriacal delusions, ideas of self-accusation, cenesthetic hallucinations, disturbed volitional-instantive-dynamisms are recorded at the Clinic. Contrast-enhanced NMR of endocranium shows changes in the form of encephalomalacia, a porencephaly that indicates a condition after cerebrovascular insult. She received low doses of haloperidol (2 mg pd), antidementia and vasoactive therapy, which led to reduction in psychotic symptoms and initial improvement in cognitive-mnemonic functioning.

Conclusion: The presentation of this case confirms the neurotoxicity of SARS-CoV-2 virus and is in accordance with the available literature. The neuropsychiatric and cognitive complications that accompany COVID-19 are different and significantly affect the health status of persons who have experienced COVID-19. It is necessary for healthcare systems to recognize this problem and enable organized neuropsychiatric and cognitive monitoring for patients suffering from COVID-19.

Key words: Covid-19; Neuro-psychiatric consequences; Pandemic

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SARS CoV-2 Pneumonia in Patient with Lung Transplantation - A Case Report

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Background: Solid organ transplant recipients are considered at a high risk for severe COVID-19 disease. Approximately 100 cases of SOT and COVID 19 infection were reported.

Case report: We present a case of an unvaccinated 47-year-old man eleven years after bilateral lung re-transplantation who presented with SARS CoV-2 infection. He underwent bilateral lung transplantation because of pulmonary hypertension in 1998 and after rejection re-transplantation in 2011 was performed. Immunosuppression consisted of tacrolimus 2 mg daily, mycophenolate mofetil 1.5 gr and 5 mg prednisolone daily. The patient was admitted at our hospital in January 2022 due to fever up to 37.5C, cough and increased nasal secretion, fatigue, tiredness and bloody sputum. Chest radiography and CT scan demonstrated bilateral pneumonitis with consolidation zone and fibrosis changes. In treatment MMF was excluded and continued with tacrolimus and puls doses of methylprednisolone 1.5 mg/kg/day for three consecutive days and the dose was gradually tapered for the following four weeks. Patients also received therapy per protocol for SARS COV-2 infection. Clinical and radiographic remission of changes was achieved but during this period the patient developed acute kidney injury (AKI) and diabetes mellitus de novo which required additional treatment. Patients proceed further treatment at the MMA and discharged with stable graft function on February 22, 2022.

Conclusion: Management of lung transplant recipients is challenging in patients with respiratory symptoms. There is currently limited data on manifestations, management, and outcomes in lung transplant recipients who develop this novel infection.

Keywords: solid organ transplantation, immunosuppression, viral infection

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Incidence of Deep Vein Thrombosis in Hospital-Treated COVID-19 Patients with CTA-Verified Pulmonary Thromboembolism

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Background: Previous publications have noted a high risk of pulmonary thromboembolism (PTE) in patients hospitalized for COVID-19 pneumonia. The aim of this study was to evaluate the incidence of deep vein thrombosis (DVT) in patients with COVID-19 who developed PTE.

Methods: This retrospective observational study included patients hospitalized at COVID Hospital Batajnica in the period from December 2020 to March 2021, with a diagnosis of COVID-19 interstitial pneumonia, verified PTE on CT pulmo-angiography and ultrasound examination under suspicion of lower extremities DVT.

Results: The study included 102 patients, with a mean age of 70 years (IQR 22–92), with no gender differences (51% were men). DVT was found in 52 patients (51%), with a slightly higher number of isolated distal thrombosis (29 vs. 22 %). The ratio of observed central and peripheral thrombus localization in the pulmonary circulation was 32% vs. 68%, in both groups, half of the patients had DVT (51%; 49%), with a difference in a slightly higher number of isolated distal thrombosis in central thromboembolism (65:35 %; 59:41 %). Bilateral PTE was described in 33 patients, 55% of whom had DVT. All patients received prophylactic doses of low molecular weight heparin due to elevated D-dimer values.

Conclusions: Our study showed an incidence of 51% DVT in the group of patients with COVID-19 and PTE. These results may suggest that PTE in these patients may be due to a pronounced local thrombo inflammatory syndrome caused by SARS-CoV-2 infection rather than a thromboembolic event.

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Risk Factors for Severe Ill COVID-19 Patients

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Background: COVID-19 is current global disease with high rate of morbidity and low rate of mortality, but in past two years has caused millions of deaths worldwide. In our prospective study we tried to identificate risk factors for longer hospitalization and poor outcome.

Methods: This was a prospective study in patients hospitalized with confirmed COVID-19, in a period 1st December 2021 until 31st January 2022. Many risk factors have been identified such as old age, male gender, vaccine, staying in ICU, underlying comorbidities - hypertension, diabetes, chronic lung diseases, malignancy.

Results: Of the 298 patients, 272 (91.3%) patients survived and 26 (8.7%) died. Mortality was 8.07%. The median age of the cohort was 65.37+15.55 years (IQR 18-94), male 59.9% with mean age 66.13+14.29, female 40.1%, mean age 64.85 +16.54 years. Factors that were associated with time of hospitalization were advanced age (older than 65 years), gender male, vaccine (min. two doses), comorbidities – hypertension and diabetes, treatment in ICU.

Conclusion: Males' advanced age, hypertension were the independent risk factors of prolonged hospitalization among COVID 19 patients. The study is prepared in a small sample of patients in a relatively short time.

Keywords: COVID-19; factors; hospital.

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Guillain-Barre Syndrome Associated With SARS-CoV-2 Infection

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Background: As of the end of February 2022, there has been more than 420 million confirmed cases of COVID-19, with a wide clinical range from asymptomatic cases to a development of pulmonary and variety of non-pulmonary manifestations, including neurological, cardiovascular, hematological, renal, dermatologic and gastrointestinal manifestations.

Case description: A 59 years-old female presented to the emergency department of regional hospital with symptoms of sudden weakness in legs, preceded with a sensation of paresthesia in hands and feet, as well as elevated blood pressure values recorded during that day. Nasopharyngeal swab for COVID-19 antigen test was positive nine days prior to admission. Neurological exam on the admission was suggestive for Guillain-Barre syndrome, and lumbar puncture was indicated and performed. On the second hospital day the patient presented the symptoms suggestive of acute coronary syndrome, accompanied with progression of neurological symptoms, which led to a transfer in ICU, where it is proceeded with further diagnostic investigations and treatment, until the discharge 40th day after first admission.

Conclusions: We have described a case of neurological involvement in a complicated disease course associated with SARS-CoV-2 infection. The anamnestic, clinical and laboratory evidence, as well as the response to IVIG therapy, leads to a likely causal association with SARS-CoV-2 infection. In a case of COVID-19 a comprehensive diagnostic approach must be followed, owing to the large variety of multisystem symptoms that patients might present, as well as a multidisciplinary management in their course of treatment.

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Continuous Renal Replacement Therapy in Management of Acute Kidney Injury in Patients with COVID-19: A Single Center Experience

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Background: The coronavirus disease 2019 (COVID 19) pandemic is still ongoing. Around 5% of patients develop severe symptoms, which can include multiple organ failure. Cytokine storm is one of crucial mechanisms for worsening of severe circulatory collapse. Acute kidney injury (AKI) ranges from mild to progressive forms necessitating renal replacement therapy (RRT) with specific continuous renal replacement therapy (CRRT) adjustments and possible use of cytokine removal strategies.

Methods: In this review study we examined data on patients with AKI treated with CRRT in Covid hospital of University Clinical center of Serbia from October to December 2021. Demographic, biochemistry and data regarding CRRT procedure were collected from patients' medical history.

Results: During study period eight patients, average age 63 ± 13.6 , of which 4 (50%) men, with severe form of COVID 19, respiratory failure and hemodynamic instability developed AKI and were treated with CRRT. All patients were on vasopressor therapy and mechanical ventilation. Length of CRRT was median 3 days, with IQR 2. Lethal outcomes were recorded in all patients.

Conclusions: Application of extracorporeal therapy in critically ill patients with AKI has pathophysiological rationale. AKI patients are at higher risk for severe outcomes and mortality. Certain criteria, such as the need for vasopressors, could be established as a prediction model in order to help standardized criteria to guide early therapy start and hopefully better outcomes.

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The Course Of COVID-19 in A Patient With 22q11.2 Deletion Syndrome and Hypogammaglobulinemia After Rituximab Therapy: Case Report and Literature Review

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Background: Patients with immunodeficiency are at increased risk of severe form of COVID-19. The risk of acquiring a severe form of the disease depends on the type of immunodeficiency, and the presence of additional risk factors such as older age, low baseline lymphocyte count and presence of co-morbidities. 22q11.2 deletion syndrome (22q11.2DS, previously Di George syndrome) includes a wide range of clinical features such as face abnormalities, congenital heart anomalies, hypoparathyroidism and thymic aplasia/hypoplasia leading to the susceptibility to infections and autoimmune complications. There are very limited data on the course of COVID-19 in this group of patients.

Methods: Case report and literature review.

Results: We present a fatal case of a 24-years old female patient who developed a severe form of COVID-19, with extensive bilateral pneumonia and rapid development of multiple organ failure. The patient suffered from 22q11.2DS with thymic hypoplasia diagnosed in early childhood. Due to development of severe refractory autoimmune thrombocytopenia she was successfully treated with rituximab. However, shortly after a severe hypogammaglobulinemia due to the persistence of B-cell depletion developed, leading to recurrent pneumonias and formation of extensive bronchiectasis. She started intravenous immunoglobulin substitution therapy with no more serious infections afterwards. Review of the literature revealed only a few cases of COVID-19 in patients with 22q11.2DS, mostly with favorable outcomes.

Conclusion: Although some reports indicated that patients with 22q11.2DS are not necessarily at increased risk of severe COVID-19, presence of severe hypogammaglobulinemia and extensive bronchiectasis represent additional risk factors influencing the severity and outcome of COVID-19.

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Hypoalbuminemia and COVID-19 Treatment Outcome

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Background. COVID-19 has rapidly unfolded from an epidemic outbreak in Wuhan, China into a global pandemic of international interest. There is a small number of lately published studies that suggest that lower levels of human serum albumins are strong predictors for patients' mortality during hospital treatment. Proposed pathological mechanism, suggests that under conditions of oxidative stress, serum albumins may sustain irreversible oxidation, which impairs antioxidant property and eventually causes tissue damage. The aim of this study was to explore the correlation of hypoalbuminemia with the treatment outcome of COVID-19.

Methods. Our study was conducted in the Clinic for infectious diseases at the University Clinical Center Kragujevac during the time frame from January to July, 2021. It was designed as a case series and it included patients of age greater than 18 years and positive Polymerase Chain Reaction test or serological (antigen) test on SARS-COV-2 who were treated at our clinic. Hypoalbuminemia was determined as a serum albumin concentration which was less than 35 g/L.

Results. Our study included 300 patients (male/female:66.7%,33.3%), while mean age \pm standard deviation was 63.63 ± 15.52 . Lower level of albumins was significantly correlated with the intrahospital mortality, whereas $p=0.007$ and correlation coefficient was 0.484. Mean levels of serum albumin was 31.54 ± 3.9 g/L in patients who died, while it was 35.63 ± 4.2 g/L in those who survived.

Conclusions. Our study results suggest that hypoalbuminemia could be used as a significant prognostic factor for intrahospital mortality in COVID-19 patients.

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The Frequency and Characteristics of COVID-19 Vaccine-Related Headache in Student Population

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Background: Vaccination is an effective way to control pandemic caused by SARS-CoV-2 virus. Side effects are reported in the literature, among those, headache, with the prevalence of 30.6% to 50%. The aim of this study is to examine the frequency and characteristics of COVID-19 vaccine-related headache within the student population and to identify its potential predictors.

Methods: The study was conducted among the students of the Medical Faculty, University of Belgrade, in a form of anonymous online survey. Demographic characteristics, type of vaccines, features of post-vaccination headache and presence of primary headaches were analyzed.

Results: Among 220 participants, 65 (29.5%) reported headache, occurring 6h (1-36h) after vaccination, with a mean duration of $18.36 \pm 6h$. Participants who developed headache after vaccination against SARS-Cov-2 were more likely to report headache after receiving the vaccine against any other pathogen compared to the group without headache (9.2% vs. 2.6%, $p=0.031$). The independent predictors of post-vaccination headache are type of vaccine, particularly vector type, compared to inactivated vaccines ($p<0.01$) and previous primary headaches ($p<0.01$). Participants with migraine, after the administration of COVID-19 vaccine, developed more frequently intense headaches ($p=0.002$), headache worsening on physical activity ($p=0.003$), nausea ($p=0.040$) and hypersensitivity to light ($p=0.016$) than those with preexisting tension-type headaches.

Conclusions: Headache is a possible side effect of the vaccine against COVID-19, being influenced by type of vaccine and the presence of primary headaches. Headache has variable presentation, mostly resembling habitual primary headaches.

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A Case of Effective Intravenous Methylprednisolon Pulse Therapy in Extremely Obese Patient with Severe COVID-19

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Background: During the COVID-19 pandemic, several studies showed correlation between severity of COVID-19 pneumonia and obesity. Obesity was also described as a risk factor for hospitalization, intensive care unit admission, need for invasive mechanical ventilation and death among COVID-19 patients. Lastly, some studies showed efficacy of methylprednisolone pulse therapy in the treatment of severe COVID-19.

Case description: We report a case of extremely obese patient (BMI 41.5 kg/m²), with past medical history of insulin independent diabetes mellitus, suffering from severe COVID-19 pneumonia successfully treated with steroid pulse therapy. Upon admission to our hospital the patient had signs of pneumonia on initial chest x-ray as well as high inflammatory markers on laboratory blood tests. On the third day of hospitalization, his respiratory difficulty worsened, inflammatory markers soared and the chest x-ray showed the progression of pneumonia. Therefore, broad-spectrum antibiotics and corticosteroid pulse therapy were initiated. Oxygen supplementation was intensified up to 30L/min to maintain SpO₂ >95%. He clinically improved three days after the therapy was started, along with significant decrease of inflammatory markers and oxygen enrichment. A month after steroid pulse therapy was administered, control chest x-ray and laboratory blood tests revealed no abnormalities.

Conclusion: In this case, steroid pulse therapy showed efficacy in the treatment of severe COVID-19 pneumonia. It improved pulmonary involvement, oxygen saturation, dyspnea, heart rate, respiratory rate, body temperature and inflammatory markers, namely CRP. The reason for the positive outcome may be timely recognition and administration of steroid pulse therapy in the early pulmonary phase of COVID-19 pneumonia.

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Symptoms of COVID-19 Patients

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Background: People with COVID-19 have had a wide range of symptoms: fever, cough, shortness of breath, sore throat, runny nos, diarrhea. In our prospective study we tried to identificate symptoms that lead patients to be tested on SARS COV-2.

Methods: This was a prospective study in patients hospitalized with confirmed COVID-19, in a period 1st December 2021 until 31st January 2022. Main symptoms are fever, cough, sore throat, runny nos.

Results: Of the 298 patients, 194 (65.1%) complained cough, 258 (86.6%) fever, 44 (14.8%) sore throat and 13 (4.4%). Other symptoms like diarrhea, chest pain, muscle pain less than 1%. Mean time from first symptom to testing for SARS CoV-2 was 4.21+3.28 days (IQR 1-22). Time from expressing symptoms up to admittance in hospital was 7.05+3.78 (IQR 0-20). Time from positive test (Ag/PCR RT) to admission to hospital was 3.83+3.53 days (IQR 0-14).

Conclusion: Symptom and signs of COVID 19 are specific and it is easy to recognize. It is obvious that there is no need for patients to be tested on SARS COV-2 before 3th day from expressing symptoms.

Keywords: COVID-19; symptoms; hospital.

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Correlation Between Clinical Presentation, CT Severity Score And Disease Outcome Among Hospitalized Vaccinated and Unvaccinated COVID-19 Patients

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Background: Understanding of the benefits of COVID-19 vaccination on disease outcomes requires consideration of the clinical and imaging characteristics of patients who developed COVID-19 despite vaccination and comparison with those of unvaccinated patients.

Methods: Randomly selected 100 patients, hospitalized between 12. 2021. and 02. 2022. in COVID Hospital Batajnica, were enrolled. All patients underwent chest CT examination and CT severity score (CT-SS) was calculated. They were divided into two groups according to vaccination status. Differences amongst vaccinated and non-vaccinated were tested using the Mann-Whitney U test and Chi-square. Spearman correlation analysis was used to identify associations between variables.

Results: The mean age of patients was 69 years ± 13.9 . The 52% were vaccinated, 48% were unvaccinated. No significant differences in age and gender were observed between the groups. The mean CT-SS in vaccinated patients was 10.4 ± 5.8 and 12.4 ± 6.8 in unvaccinated. The difference in CT-SS between the groups was insignificant. However, the differences amongst groups were significant in the number of lethal outcomes and number of patients requiring mechanical ventilation. Significant positive correlations were found for lethal outcomes with CT-SS and ventilation support. Vaccinated status and the number of received doses were negatively correlated with progression to death. There were no significant correlations found between age of the patients nor gender in relation to clinical outcomes and CT-SS.

Conclusions: Observed differences among vaccinated and non-vaccinated COVID-19 patients hospitalized during the Omicron Wave suggests that vaccination may reduce disease progression to critical illness.

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Delirium Bonhoeffer Psychosis and COVID-19

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Introduction: During the Covid-19 pandemic, a significant number of delirious clinical pictures were recorded in intensive care units as a complication of the toxicoinfectious syndrome.

Case study: Patient M.S. 83 years old, retired, lives with his family, without any psychiatric history. He suffers from hypertension, arrhythmia.

In October 2021, he was infected with SARS CoV-2 virus. Symptoms of infection were firstly mild: low-grade fever, shivering, muscle ache, weakness. Infectious syndrome was proven in the lab. Antiviral treatment was initiated (favipiravir) with addition of prednisone, an antipyretic, and multivitamin therapy. Three days later, the somatic condition worsened: therapeutically resistant fever, profuse sweating, decreased saturation of oxygen (84%). A day later, symptoms of delirium syndrome appeared, type Bonhoeffer toxicoinfectious psychosis: spatio-temporal disorientation, visual hallucinations, incoherent thought flow, cognitive-mnemonic denaturation, disorganization of behavior, with the presence of hyperactivity of the autonomic nervous system. Visual hallucinations lasted for 72 hours.

Treatment was continued on two levels – of an infectious and delirium syndrome. The therapy included ceftriaxone, rivaroxaban (due to a significant increase in the value of D-dimer), rehydration parenteral therapy, prednisone was substituted with dexamethasone (neuroprotective corticosteroid), with the antipsychotic olanzapine (2.5 mg pd), anxiolytic and cerebro-vasoactive therapy.

Productive psychopathological experiences are gradually reduced as infection subsided, with confusion, bradypsychia, and slow motor skills remaining. One month later, complete recovery of the acute brain syndrome was recorded, but the chronic brain syndrome with a cognitive-mnemonic deficit and slowed psychomotor skills persisted.

Conclusion: There is a direct connection between COVID-19 and the occurrence of Bonhoeffer toxin-infectious psychosis.

Key words: Delirium; Covid-19; Bonhoeffer psychosis

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Pulmonary Thromboembolism in Patients with Coronavirus Disease and Chronic Renal Failure

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Background: The hypercoagulable state in COVID-19 has been associated with poor prognosis in patients infected with SARS-CoV-2. Pulmonary thromboembolism occurs in severe Covid 19 infection.

Methods and Results: In our case report, an 81-year-old patient with COVID-19, chronic renal failure and developed pulmonary thromboembolism was presented. Also, higher levels of d-dimer, fibrinogen, and fibrinogen degradation products, prolonged prothrombin time (PT), international normalized ratio (INR), and thrombin time (TT), elevated platelet count, increased plasma creatinine and urea were noted in patient. The patient was treated with antibiotic therapy, Low molecular weight heparin (LMH heparin) and other symptomatic therapies for chronic renal failure. An excellent clinical and haemodynamic response was observed.

Conclusions: Viral infections in many cases can activate the systemic inflammatory response and disrupt the balance between procoagulant and anticoagulant effects. Coagulation pathways and the immune system are connected. Thrombotic complications in COVID-19 patients could explain the interaction between coagulation and inflammatory pathways in the bronchoalveolar compartment.

Keywords: Pulmonary thromboembolism; COVID-19; chronic renal failure

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Headache Associated with Wearing Personal Protective Equipment During The COVID-19 Pandemic In Serbia

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Background: Headache is one of the most common side effects of using personal protective equipment (PPE) among healthcare professionals. The aim of the study is to examine the occurrence and characteristics of headaches associated with the use of PPE among healthcare workers in Serbia during the COVID-19 pandemic.

Methods: The research was conducted among nurses, doctors and other staff employed in primary, secondary and tertiary health care institutions in Belgrade. Data were collected through an anonymous online survey in the period from January 23, 2022 to February 12, 2022.

Results: Among 367 health professionals, 301 (82%) reported headaches related to wearing PPE. Headache was associated with wearing KN95 masks in 211 (57.5%); face shields in 205 (55.9%); goggles in 111(30.2%) and surgical masks in 107 (29,2%). Bilateral presentation, moderate intensity and pressing quality were most frequently reported headache characteristics. The negative impact on work productivity, due to headaches, was reflected in 245 (66.8%) respondents. As many as 261 (71.1%) respondents wanted to take off their PPE during their professional activities due to headache. Employees at COVID hospitals were significantly more likely to have headaches compared to other subjects ($p < 0.01$), as well as nurses compared to doctors and other staff ($p < 0.01$).

Conclusion: Headache associated with wearing PPE is a common problem among health professionals that negatively affects their ability to work. Employees at COVID departments and nurses are at higher risk of developing this secondary headache.

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Is there Connection Between D-Dimer, CRP, Ferritin and Chest CT Score?

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Background: The virus was identified as a coronavirus on 26 January 2020, later named the SARS-CoV-2 virus by the World Health Organization. The plasma D-dimer level increases during blood thrombosis and degradation of fibrin, therefore plasma D-dimer could be a biological marker of hemostatic abnormalities and thrombosis. CRP is a type of protein produced by the liver that is elevated in response to inflammation. The aim of this study was to evaluate the prevalence of pulmonary thromboembolism in patients with COVID-19 and to determine if there was a link between levels of D-dimer, serum CRP, ferritin and chest CT score and acute pulmonary thromboembolism (PTE) in COVID-19 patients.

Methods: This retrospective study includes patients with COVID-19 treated in December 2021 at COVID hospital Batajnica, University Clinical Center of Serbia. 67 patients, mean age 67 ± 12.8 with suspected PTE were included. PTE was diagnosed with CT pulmonary angiogram. The values of D-dimer, serum CRP and ferritin were measured just before CT PA diagnosis, as well as chest CT score were monitored. All data were collected from electronic medical records. Cases with unmeasurable CT scores, and no data on reliable laboratory values, were excluded from the study.

Results and Conclusions: CT PA showed 9 (13.4%) cases of PTE of which 2 were associated with DVT. Fatalities occurred in 22 (32.8%) cases, 4 (6%) in those with confirmed PTE. The measured mean value of D-dimer in PTE was 12.06 ± 10.56 , while in patients without PTE it was 7.55 ± 10.16 . PTE isn't significantly associated with CRP, ferritin and CT scores.

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Retroperitoneal Hematoma: An Unexpected Complication of Anticoagulant Therapy in COVID-19 Patients

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Almina Hasanovic¹

Background: Coronavirus disease 2019 (COVID-19) is associated with high inflammatory response, hemostatic disturbances, and high thrombotic risk. Despite thromboprophylaxis, high incidence of thromboembolic events has been reported with a consequential increase of anticoagulant therapy from standard to intermediate or even therapeutic doses. However, published evidence on the incidence and outcome of the hemorrhagic complications of applied therapy is still limited.

Methods and Results: We report two female, COVID 19 patients, treated with anticoagulant therapy and suffering from major spontaneous retroperitoneal bleeding. The first, 64-year-old patient, admitted to the Intensive Care Unit (ICU) on low-flow oxygen (non-rebreathing mask, 10 lpm) was managed with a therapeutic dose of anticoagulant therapy adjusted to anti-Xa assay. The cumulative dose was 150 IU/kg BW. The second, 60-year-old patient did not require the ICU level of care (nasal cannula, 2 lpm) and applied therapeutic doses of anticoagulant therapy were calculated according to the body weight. When massive bleeding was suspected, both of them were transferred to another hospital and underwent emergency open surgery. No active surgical bleeding was detected and retroperitoneal hematomas were assumed to be complications of the applied therapy. Both patients were discharged and fully recovered.

Conclusions: Although rare, massive bleeding requires attention when considering anticoagulant therapy in COVID 19. Uncommon sites of spontaneous bleeding suggest additional evaluation on a case-by-case basis, given that a diagnosis is often delayed due to a lack of specific presenting symptoms. Further studies are needed to verify the risk-benefit ratio of different regimens of the anticoagulant therapy in patients with COVID-19.

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Treatment of Intermediate-High Risk Pulmonary Embolism In a Patient With COVID-19

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Background: Clinical experience and study results have shown that thromboembolic complications are reported in 30% of patients with COVID-19 during hospitalization. Therefore, in these patients, any occurrence of dyspnea accompanied by tachycardia and hypotension should raise the suspicion of pulmonary embolism (PE).

Case Report: A 72-year-old patient was admitted to the hospital due to weakness, fatigue, shortness of breath and swelling of the left lower leg. Twelve years before hospitalization, due to ovarian cancer, the patient underwent a hysterectomy with total adnexectomy. After the COVID 19 infection is confirmed, she is admitted to our institution. At the admission, the patient was conscious, normotensive with a shock index of 0.91, and had dyspnea and tachypnea. Multiple elevated values of inflammation markers and D dimer were registered. Signs of right ventricular dysfunction with preserved left ventricular systolic function were registered echocardiographically. Clots in both main branches of the pulmonary artery were observed on CT pulmo-angiography. Primary therapy with unfractionated Heparin was initiated. On the sixth day of hospitalization, there was a hemodynamic deterioration followed by shock. Actylisa was administered according to the PE protocol (Actylisa 10 mg i.v. bolus and then 90 mg over the next 2 hours). Further treatment was continued with anticoagulant therapy. The patient was discharged in stable condition.

Conclusion: Intermediate-high-risk PE is a therapeutic challenge because, in addition to initial hemodynamic stability, hemodynamic decompensation often occurs, which requires urgent thrombolytic therapy. Therefore, patients with intermediate-high risk PE and COVID 19 infection require constant and careful clinical monitoring.

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Impact of Anesthesiologist's Engagement on Surgical Activity in Covid Time at the Clinic for Digestive Surgery: One Center Experience

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Milica Savić¹, Katarina Lolić, Ivan Palibrk^{1,2}

Background: The presence of Covid-19 virus was proven for the first time in Serbia in March 2020. Since then, health institutions have been divided into, Covid and Non-Covid. Still, the doctors and nurses have been the same in both systems.

Background: The study was performed at the Clinic for Digestive Surgery of the University Clinic Center Serbia. We investigated the number of operations performed during the Covid-19 pandemic two years (2020 and 2021) and compared with the control group - years before pandemic (2018 and 2019). The aim of this study was to show how the number of simultaneously engaged anesthesiologists in covid and non-covid hospitals affected the number of elective operations.

Results: There was a statistically significant difference in the number of operations before and during pandemic ($p < 0.005$; 8801 procedures vs 4908). We observed a significant difference in benign surgical procedures ($p < 0.005$; 4590 vs. 1316), as well as in esophagogastric operations, ($p < 0.005$, 514 vs. 399). The number of operations in hepato bilio pancreatic, colorectal and bariatric surgery, remains almost the same ($p > 0.005$). Hence, there is a significant relationship between the number of anesthesiologists deployed in the covid system and the number of operations at the clinic, as well as in the number of employed anesthesiologists at the Clinic in pre and during covid period ($p < 0.005$; 14 vs. 5).

Conclusion: Since the beginning of the pandemic, anesthesiologists are engaged in two workplaces, which affects the treatment of surgical patients.

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Neurological Complications in Patient with COVID-19 Pneumonia with Data on Alcoholism – A Case Report

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Background: The coronavirus belongs to a group of viruses which attacks the central nervous system. There are various neurological manifestations which should be recognized as part of the acute phase of COVID-19. Disturbance of the level of consciousness and seizure are the most common neurological manifestations and usually occur later than respiratory signs.

Case presentation: In a 70-year-old man patient, fatigue, fever, cough and dyspnea were the initial manifestations of the disease. In the first week, after detection COVID-19 he was treated with Favipiravir, but the worsening of respiratory symptoms led to the hospitalization of the patient. He was admitted to a hospital with an oxygen saturation of 94%, radiographic signs of bilateral pneumonia and positive markers of inflammation. His medical history indicated arthritis, rheumatoid, and no history of drugs. He was an alcoholic until one year ago. During hospitalization he was treated with dexamethasone, ascorbic acid, antibiotics and Fraxiparine, and he was hemodynamically stable. A lung-CT-scan pattern of bilateral ground-glass opacity was noticeable. Over the next few days, the patient's mental status and consciousness led to two generalized seizures, tremor and anxiety. His brain-CT-scan, D-dimer and oxygen saturation did not show a pathological finding. After a neurological examination these symptoms were understood as a consequence of alcoholism and he was treated with benzodiazepines. The electroencephalography and psychiatric examination after hospitalization were advised by neurologists.

Conclusion: A detailed medical history about consuming alcohol and adequate diagnostics are required before concluding that neurological symptoms are not a consequence of COVID-19.

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Gastrointestinal Symptoms in COVID-19 Patients

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Background: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a global threat and a huge problem for our community. There are so many opened questions. The aim of this study is to establish the frequency of gastrointestinal symptoms in hospitalized patients with this infection, but also to compare if patients with gastrointestinal symptoms have higher CT scan severity score of interstitial pneumonia.

Methods: Our database comprises 322 patients who were divided into two groups, patients with and without gastrointestinal symptoms. All the information was taken from anamnestic data and patient's history, followed by statistical analysis.

Results: Thorax CT scans of 206 patients (63.97%) were described as bilateral interstitial pneumonia and 76 CT scans (36.89%) were described by radiologists as the peak of infection. Moreover, 130 patients (40.37%) had gastrointestinal symptoms, and even 58 out of 130 patients (44.62%) reported gastrointestinal symptoms as the first manifestation of COVID-19. The most commonly reported one was a lack of appetite (73 patients or 56.15%). Furthermore, 65 patients (50%) reported diarrhea, 25 patients (19.23%) reported nausea and vomiting while 9 patients (6.92%) reported abdominal pain. As well, patients with bilateral interstitial pneumonia and gastrointestinal tract symptoms (31 of them or 40.79%) did not have a higher CT scan severity score in peak of the disease compared to the patients without gastrointestinal symptoms (45 of them or 59.21%), (p-value: 0.704).

Conclusions: Gastrointestinal symptoms often are the first manifestation of COVID-19. Therefore, every patient with newly formed digestive tract symptoms should be tested for COVID-19.

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Statin Treatment During COVID-19

Ljubica Stosic¹

Background: In the effort to battle SARS-CoV-2, the virus that causes COVID-19, investigators worldwide have often turned to medications used as therapies for other conditions in the hopes of finding ones that either kill the coronavirus or decrease the impacts from its infection.

Methods: Literature review of statin treatment in COVID-19

Results: Statins are a class of lipid-lowering drugs with various known beneficial pleiotropic effects. These drugs have been associated with reducing inflammation and blood clotting, both of which can be features of severe cases of Covid 19. Some previous investigations showed that statins have antiviral effects and are involved in the process of wound healing in the lung. Based on this knowledge, research has emerged whether statin use reduces mortality in COVID-19 patients. Researchers at the Karolinska Institute Sweden conducted a population study of almost a million people to determine the relationship between statin treatment and covid-19 mortality. Their findings suggest that statin treatment had “a modest negative association” with covid-19 mortality.

Conclusions: Given a lack of randomized clinical trial data no one is yet advising that people for whom statins aren't indicated start taking the drugs to lower their risk of dying from COVID-19. Current guidelines go only as far as advising that patients with COVID-19 who were already taking statins continue to do so and that was a practice in our Covid hospital. There is a need for prospective randomized controlled trials and extensive retrospective studies to evaluate the potential beneficial effects of statin treatment on clinical symptoms and mortality rates associated with COVID-19.

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Acute Kidney Injury Treated with Hemodialysis in Critically Ill Patients with COVID-19

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Background. In patients with COVID-19 pneumonia who are treated in intensive care units, the occurrence of AKI is a strong predictor of death. We aimed to describe the clinical and laboratory features associated with AKI in critically ill patients who were treated with hemodialysis (HD).

Methods. This retrospective study was conducted on patients (aged ≥ 18 years) treated in intensive care units of Covid hospital Batajnica in Serbia, between December 4, 2020, and April 30, 2020. Basic demographic, clinical, and laboratory parameters were analyzed in patients with AKI and treated with hemodialysis.

Results. In the mentioned period, 81 patients met the criteria for analysis. The average age of the examinees was 71.16 ± 11.18 years, of which 55 (67,9%) were male. Total mortality rate was 88,9%. Compared with survivors, patients who died had at time of diagnosed AKI significantly higher values of not only SOFA score (10.79 ± 2.99 vs. 7.89 ± 3.55 ; $P=0.011$), ferritin (10474.5 ± 30558.98 vs. 924.17 ± 779.15 ; $P=0.032$) and CRP (260.64 ± 559.94 vs. $68,76 \pm 69.2$; $P=0.048$), but also eGFR (56.39 ± 34.98 vs. 28.86 ± 28.07 ml/min).

Conclusion. AKI-required hemodialysis among critically ill patients with COVID-19 is associated with high hospital mortality rate. It is a sign of multi-organ function failure and intensive systemic inflammation. The association of previous chronic renal impairment with better survival may be an indirect indicator of a reduced and modulated immune response of those patients, but this needs to be confirmed in a larger number of subjects.

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Coexistence of Guillain-Barre Syndrome and COVID-19

– A Case Report

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Background: Over the course of the COVID-19 pandemic, a wide spectrum of neurological manifestations and complications have been recognized and described in literature, including immune-mediated neurological diseases. Guillain Barre syndrome (GBS) is a rare autoimmune neuropathy which is typically presented with acute flaccid symmetrical weakness of the limbs and areflexia, and is often preceded/triggered by infections.

Methods: In this paper we report a patient infected with SARS-CoV2 who developed symptoms of GBS during the acute phase of COVID-19.

Case presentation: A 59-year-old woman presented with distal limb paresthesia followed by lower-limb weakness, which appeared a week after a patient's antigen test was reported positive for SARS-CoV2. After a course of several days, her condition progressed to severe symmetrical weakness of all four limbs and neck flexors and areflexia. Due to the appearance of respiratory insufficiency as well, the use of mechanical ventilation was indicated. The cerebrospinal fluid analysis revealed a mild albuminocytologic dissociation. Due to technical reasons in the COVID department nerve conduction study (NCS) and electromyography (EMG) were not performed. All other diagnostic procedures were normal. She was treated with intravenous immunoglobulins followed by physical rehabilitation, after which her condition significantly improved.

Conclusion: Given the unpredictable nature and course of COVID-19, we are facing a major diagnostic and therapeutic challenge. We want to emphasize that GBS should be considered as a potential neurological complication or even comorbidity of this disease, in order to initiate adequate therapy in a timely manner and prevent an adverse outcome.

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Role of Radiological Modalities in Diagnosis and Monitoring of COVID-19 Patients with Spontaneous Pneumothorax and Severe Panacinar Emphysema

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Background: Chest x-ray and computed tomography (CT) play an important role in evaluation of patients with COVID 19. The aim of this presentation is to depict role of these imaging modalities in a patient with of COVID-19 with spontaneous pneumothorax and severe panacinar emphysema

Methods: 81 years old patient from Belgrade, treated in specialized COVID hospital in Batajnica, his symptoms were cough, temperature and fatigue. After clinical examination, lab analysis, the patient was subjected to multiple x-ray examinations, and CT scans.

Results: Our patient is an 81-year-old man with a previously diagnosed COPD. He appears in the outpatient clinic due to problems in the form of fever and cough for the past 8 days. After routine laboratory analyzes, bilateral pneumonia confirmed on X-ray examination, and a positive test, he was admitted to our hospital. The initial vital parameters were: T 38%, TA, FR, Sa 88%, and after placing the oxygen mask on 6l O₂ it improves to 98%. 8 days of hospitalization, clinical deterioration occurs, the patient is tachypneic, anxious, SA87% on 8l. After MDCT pulmonography, right-sided hydropneumothorax was verified, with pronounced destructive changes of the lung parenchyma according to the type of panacinar emphysema, diffuse on both sides, with thickening of interstitial septa. Other typical CT signs of COVID19 pneumonia are not visualized due to diffuse parenchymal involvement with emphysema. The patient is transferred to the intensive care unit, after active thoracic drainage of the right pleural cavity, he corrects Sa to 95% on an oxygen mask at an O₂ flow of 12 l. After 6 days, the patient worsened clinically again, desaturated to 79% on 10l O₂, decided to switch to NIV (CPAP mode, PEEP7, FiO₂ 96%), and left-sided pneumothorax

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was verified. After 3 days the patient went to cardiac arrest, intubated MV SIMV Sp 91% PEEP. Due to the better general condition of the patient, after two days of extubation, he maintained Sa 96% on 12l O₂.

Conclusions: Radiological diagnostic procedures, chest x-ray and CT, are important tools not only in initial evaluation but also in follow up of patients with COVID 19 and further therapeutic decision making. Review of radiographs and CT scan in COVID19 patient with spontaneous pneumothorax and severe panacinar emphysema, who was hospitalized in COVID hospital "Batajnica".

Rotational Thromboelastometry (Rotem) Profiling of COVID–19 Patients

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Background: Thrombosis is frequently diagnosed in patients with Coronavirus disease (COVID - 19), despite the use of thromboprophylaxis. Rotational thromboelastometry (ROTEM) could be more effective in identifying hypercoagulable patterns and patients in high-risk of thrombosis than conventional coagulation tests (CCTs). Our aims were to analyze ROTEM parameters across the entire clinical COVID-19 pneumonia spectrum and to determine the incidence of hypercoagulable ROTEM patterns.

Method: We evaluated coagulation abnormalities via CCTs and ROTEM in a group of 94 patients with confirmed SARS-CoV-2 infection and different severity of pneumonia (34 moderate, 25 severe, 35 critical). Decreased clotting time (CT) and increased maximum clot firmness (MCF) in both extrinsic (EXTEM) and fibrinogen pathway (FIBTEM), as well as decreased EXTEM clot formation time (CFT) and higher than normal α -angle, were classified as hypercoagulable state.

Results: At least one hypercoagulable ROTEM parameter had 62 (66%) patients. Increment in the number of patients with ≥ 2 hypercoagulable parameters, higher EXTEM MCF ($P = 0.0001$), higher FIBTEM MCF ($P = 0.0001$) and decrement in maximum lysis ($P = 0.002$) were observed with increment in disease severity ($P = 0.0001$). Significant positive correlations between interleukin - 6 (IL6) and CT EXTEM ($P = 0.003$), MCF EXTEM ($P = 0.033$), MCF FIBTEM ($P = 0.01$), and negative with maximum lysis EXTREME ($P = 0.006$) were seen.

Conclusions: Our findings confirmed that a hypercoagulable ROTEM pattern was more frequent in advanced disease groups and patients with high IL6. These results supported the need for different thromboprophylaxis approaches for different severity groups.

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Pneumomediastinum and Subcutaneous Emphysema Complicated with Atypically Presented Hydropneumothorax in Patient with Severe COVID-19 Pneumonia: Case Report

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Background: Pneumomediastinum with subcutaneous emphysema is rare complication of severe COVID-19 pneumonia, and sometimes is further complicated with development of pneumothorax.

Case presentation: We present a patient with severe COVID-19 pneumonia (severity score on CT of thorax 23/25) complicated with development of pneumomediastinum with subcutaneous emphysema and pneumothorax. At the moment of diagnosis using low-dose CT of thorax, the patient was intubated (mechanically ventilated SIMV FiO₂ 100% PEEP 10 P_{insp} 25 P_{sup} 15 RR 18/min). CT presented massive subcutaneous emphysema, massive pneumomediastinum and partial left-sided pneumothorax with level of liquid in left pleural cavum. Hydropneumothorax was presented in close contact with spine, aorta and processus transversus of thoracic spine, most likely boarded with pleural adhesions. Pneumothorax was unsuitable for placement of chest tubes, and it was decided to treat patients conservatively. Two days after diagnosis the patient passed away due to cardiorespiratory insufficiency.

Conclusion: Pneumomediastinum with subcutaneous emphysema is a serious complication of COVID-19 pneumonia, particularly when it is further complicated with development of pneumothorax which is sometimes challenging for treatment.

Key words: Pneumomediastinum, subcutaneous emphysema, hydropneumothorax, COVID-19 pneumonia.

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Cerebral Ischemia and Pulmonary Embolism in Patient with COVID-19: Case Report

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Background: Since the beginning of COVID-19 pandemic, thrombotic events have been recognized as one of the most common complications among COVID-19 patients, which can result in poor outcomes despite best possible medical, endovascular and surgical treatment.

Case presentation: In this report we present a case of a 68 - years - old female patient with signs of respiratory insufficiency, hypertensive crisis and left-sided weakness accompanied with pain sensation in upper left limb on admission. The patient is a known case of hypertension, diabetes mellitus, hyperlipidemia and chronic kidney disease. At the admission, the patient was immediately treated with oxygen therapy, IV-furosemide and captopril. Brain CT scan showed no signs of acute cerebral stroke. Two hours after admission, neurological symptoms resolved completely. Due to elevated D-dimer value, ECG signs of pulmonary embolism and persistence of dyspnoea, CT pulmonary angiography was carried out, showing large thrombotic masses in both left and right main branches of pulmonary artery with propagation to all lobar and segmental branches. LMWH was administered in therapeutic dose without addition of thrombolytic therapy, due to absence of hemodynamic instability and signs of RV failure. Further hospital courses passed without additional complications and CDS of lower limb veins showed no signs of thrombotic masses. Patient was discharged with addition of NOAC along with antihypertensive, antilipidemic and oral antidiabetic drugs.

Conclusion: COVID-19 is a multisystemic disease that can cause a large number of both pulmonary and extrapulmonary disorders. In order to minimize and prevent consequences of COVID-19 associated complications, early multidisciplinary clinical approach is essential and leads to better outcomes.

Key words: acute cerebral ischemia, pulmonary embolism, thrombotic events, COVID19

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Metastatic Hepatocellular Carcinoma in the Mandible After Severe Covid Infection. Case Report.

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Background: The most common sites of metastatic spread of hepatocellular carcinoma (HCC) are lungs and lymph nodes. In the presented case, an extremely rare site of metastatic spread of HCC to the mandible being associated with Covid infection is reported.

Case presentation: A 65-year old female patient was admitted to the surgical clinic with MDCT presentation of the solitary primary liver tumor in cirrhotic liver caused by chronic hepatitis C viral infection. The patient was scheduled for surgical management and liver resection was performed with the histopathology findings of HCC. One month after the surgical treatment a patient was admitted to the COVID hospital with radiological signs of bilateral pneumonia. PCR test from nasopharyngeal swab confirmed SARS CoV-2 infection. After the symptoms subsided, the patient was discharged from the hospital on the 38th day after the admission. Two weeks after discharge, a large swelling was noticed on the left jaw and the patient was referred to the Clinic for Maxillofacial Surgery. FNAB was performed at Interventional radiology center and a pathohistological finding indicated metastatic HCC in the left mandible. PET CT findings showed no other site disease dissemination, but due to the prolonged recovery from COVID disease, as well as due to local disease progression, the surgical treatment of mandible lesion was not indicated and the treatment was continued with symptomatic therapy.

Conclusion: The impact of severe forms of COVID infection on malignant disease dissemination is still questionable and further studies are required to obtain better understanding of these processes.

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Imaging Characteristics, Frequency and Distribution of Spontaneous Muscle Hematomas in Patients Hospitalised for COVID-19

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Background: Patients hospitalised for COVID 19 are at an increased risk for spontaneous haemorrhage due to protocolary anticoagulant medication administration, but the impact of the virus itself and the infection-related coagulopathy should also be taken into account. We want to draw attention to the spontaneous muscle hematomas (SMH) development in these patients and describe their radiological characteristics and distribution.

Methods: We searched the abdominal and pelvic CT examinations in Covid Hospital "Batajnica" with the keyword "hematoma" for a period of 1 year (January 1, 2021 – January 1, 2022), evaluating distribution of the hematomas and their propagation into extramuscular adipose tissue, largest diameter of the extramuscular component and contrast agent extravasation, additionally searching for surgical treatment data.

Results: In this period, 14307 patients were hospitalised. A total of 5990 CT examinations were performed, 642 of which were of the abdomen and pelvis in 555 patients. 109 patients (0,76%), average age of 75, were diagnosed with 129 SMHs of different regions, 17 of these patients (17%) having multiple hematomas. The most common locations were the abdominis rectus and iliopsoas muscles. Contrast agent extravasation was present in 55 patients (50,5%), 29 of which required surgical treatment (26,6% of patients with registered hematomas).

Conclusion: SMHs are a serious complication in patients hospitalised for COVID – 19 with at least a fourth of the cases requiring surgical treatment. Hereby we underline the necessity for careful surveillance of possible active haemorrhage, especially in certain muscle compartments. CT examination can reliably determine the distribution and propagation of hematomas and detect active bleeding.

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Manifestation and Frequency of Pneumomediastinum in Patients with COVID-19

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Background: Pneumomediastinum is a rare complication in patients with COVID-19 pneumonia. The aim was to determine incidence of pneumomediastinum in patients with COVID-19 pneumonia and describe factors associated with outcome.

Methods: The descriptive study included 153 patients with pneumomediastinum hospitalized in COVID hospital Batajnica between December 2020 and February 2022. Patients had SARS-Cov-2 infection and computerized tomography proven pneumomediastinum.

Results: 153 cases of pneumomediastinum were identified among 17612 patients giving an incidence of 0,87%. Male patients predominated (74,5%), and average age was $62,09 \pm 13,86$. Average number of days of hospitalization were 23 days. Subcutaneous emphysema was developed in 114 patients. Emphysema of the lung was diagnosed with CT in 17% (26/153) of patients, and average severity score was 19,67. At the point of diagnosis 27,4% (42/153) patients were mechanically ventilated. Overall mortality was 67% (51/153). Lowest mortality rate was registered in patients without oxygen therapy at the point of diagnosis of pneumomediastinum. Pneumothorax as a complication of pneumomediastinum was registered in 13,0% cases (20/153).

Conclusions: Pneumomediastinum is one of negative predictors of outcome in patients with severe COVID-19 pneumonia.

Key words: pneumomediastinum, subcutaneous emphysema, COVID-19 pneumonia, pneumothorax.

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Diabetes mellitus and COVID-19

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Diabetes mellitus is a chronic systemic disease, which affects over 700.000 people in Serbia, and over 415 million people worldwide. It is estimated that by 2040 the number of diabetics will rise to 650 million. It is known that uncontrolled diabetes leads to serious cardiovascular complications including stroke, cardiovascular disease, blindness, kidney disease and amputation. Prolonged viral infection in patients with diabetes can deteriorate immune response toward aggravation of viral infection, as well as potential development of secondary bacterial and fungal lung infections. Deteriorated immune responses in diabetic patients make this population of patients more susceptible to COVID-19 in comparison to the general population. As a consequence, the risk of severe COVID-19 is more frequent. Meta-analysis of 7 studies including 1576 patients with Covid-19 showed that most frequent comorbidities were hypertension (21.1%), diabetes (9.7%), and cardiovascular disease (8.4%). The risk of death due to COVID-19 is more than 50% higher in patients with diabetes compared to those without diabetes. Mortality rate increases from 1% in acceptable regulated to 11% in poorly regulated diabetics (basal glycemia or glycemia at admission to the hospital over 10mmol/l). However, when HbA1c decreases during the course of the disease and post-infection period from 8% to 6% the risk of death from COVID-19 decreases by 29%. In conclusion, patients with diabetes were more likely to get COVID-19. Good glycemic control is of key importance in patients during COVID-19. Good glycemic control also prevents diabetic complications in patients with Covid-19.

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Significance and Importance of Epidemiological Service in Covid Hospital Batajnica

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Background: The greatest Covid hospital in Europe is the Covid Hospital Batajnica, which belongs to the University Clinical Center of Serbia began working on 04.12.2021. From its beginning to March 2022, over 19,000 COVID-19 patients were treated. The aim of the study is to showcase the importance of epidemiological surveillance and the role of Epidemiological service in Covid Hospital Batajnica.

Methods: Expert methodological instruction for prevention and spread control of SARS CoV2 (Institute of public health of Serbia Milan Jovanović-Batut,, Recommendations of the Center for Disease Control and Prevention (www.cdc.gov/getsmart/healthcare)).

Results: In Covid Hospital Batajnica, epidemiological surveillance is conducted every day. Surveillance is comprehensive, active and it includes monitoring patients and staff that work in the hospital. Employees of the Department of hospital epidemiology of Covid Hospital Batajnica (OEKBB) had taken samples from hospitalized patients for SARS-CoV2 according to recommendations regarding testing and discharging patients from the covid hospital. From 04.12.2021. to 28.02.2022. over 6000 nasopharyngeal swabs were conducted on hospitalized patients. OEKBB staff had, during the 24h/7 work hours, distributed personal protective gear to the employees that went into the red zone of Covid Hospital Batajnica. OEKBB staff had also helped other employees in removal of personal protective gear and prevented employee contamination upon leaving the red zone.

Conclusion: Conducting active epidemiological surveillance in Covid Hospital is aimed both at patients and at the staff working in Covid Hospital Batajnica. Prevention and protection of healthcare workers in Covid Hospital Batajnica are an important aspect of work for the OEKBB staff.

Keywords: COVID 19, Covid Hospital Batajnica, epidemiology department

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Barotraumatic Complications of COVID-19 in the Intensive Care Unit of CHC Zemun

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Infection with SARS CoV-2 virus mainly occurs as a respiratory infection in the form of bilateral interstitial pneumonia. In the case of severe interstitial pneumonia or development of super-infection, respiratory failure may develop with a decrease in blood oxygen saturation and the need to introduce respiratory support through a respirator. In this case, barotraumatic complications may develop as subcutaneous emphysema, pneumothorax or pneumomediastinum.

This paper includes a review of patients who developed some forms of barotrauma during the treatment of severe COVID-19 in a specially created Intensive care unit-Respiratory Center at CHC Zemun during 3 periods when our hospital was operating as a special "Covid" hospital (April-May 2020, July-August 2020 and November 2020-May 2021). In all patients with barotraumatic complications, the diagnosis was made using radiological imaging methods such as chest x-ray or chest CT.

During these 3 periods, 74 cases of subcutaneous emphysema, 58 cases of pneumothorax and 46 cases of pneumomediastinum were radiologically diagnosed in the ICU of CHC Zemun in a total of 161 patients (17 patients had a combination of 2 or 3 barotraumatic complications). For the total number of patients with complications, 152 had either severe Covid19 pneumonia or development of bacterial superinfection. Among the 161 patients observed, 143 had lethal outcomes.

The complications described represent life threatening conditions for patients and should be considered in standard diagnostic procedures for patients with COVID-19 from the intensive care unit.

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Arterial Thrombosis in Patient With COVID-19 – Case Report

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Background: Hospitalized patients with COVID-19 develop a hypercoagulable condition which is characterized by micro and macrovascular thrombosis. Evidence of venous thromboembolism in this disease has been confirmed by many studies, while data on arterial thrombosis (AT) are scarce. The incidence of AT in COVID-19 patients is approximately 4.4%.

Case report: Patient (f) age 80, is experiencing fatigue, a dry cough and diarrhea. Hypertension and diabetes are chronic diseases. On the admission oxygen saturation (SpO₂) is 95% on 12L/min oxygen support. On the chest X-ray there is bilateral pneumonia. On the tenth day of the hospitalization there is a respiratory deterioration with the present pallor of the left hand, with peak finger lividities, reduced motility and sensibility despite application anticoagulant therapy according to the leading protocol for the treatment of SARS-CoV-2. A multiple increase in the D-dimer is confirmed. The patient was put on a non-invasive ventilation mode. A CDS of arterial and venous system of the left arm is done which confirmed occlusion of the brachial artery without distal signal in the radial and ulnar artery. A successful thrombectomy of the brachial artery was done. The operative course was without complications. On postoperative check-ups the left arm is normally vascularized.

Conclusion: The occurrence of thrombosis in patients with COVID-19 is associated with a worse outcome. Except surgical procedures and a prompt thrombectomy an intensive monitoring is needed. Further research into the mechanism of AT in COVID-19 would be needed to clarify possible further prophylactic and therapeutic goals.

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Pulmonary barotrauma in hospital-treated patients with COVID-19

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Background: Increased incidence of pulmonary barotrauma has been observed as a complication of COVID19 virus infection, caused by positive pressure of mechanical ventilation during hospitalization and therapeutic treatment of this infection. Radiological and clinical manifestations of barotrauma are pneumomediastinum, pneumothorax, interstitial emphysema, pneumoperitoneum, as well as accompanying subcutaneous emphysema of the soft tissues. The aim of this study was to present the incidence of barotrauma in hospitalized patients with COVID19 virus infection and their radiological manifestation.

Methods: The study included patients who were treated at COVID Hospital "Batajnica", University Clinical Center of Serbia, in the period from 01.12.2020. to 01.01.2022. All patients underwent MDCT lung examination.

Results: Out of a total of 4021 MDCT examinations of the thorax performed in our institution, in 233 (5,7%) pneumomediastinum, pneumothorax and other prolonged conditions of pulmonary barotrauma was found. There were 67 women (29%) and 166 men (71%).

Conclusions: Patients with COVID19 pneumonia are at high risk for development of pneumomediastinum and pneumothorax, clinical and radiological characteristics of barotrauma caused by high pressures of mechanical ventilation, necessary in the therapeutic treatment. Positive pressure of mechanical ventilation is a non-physiological way of exchanging gasses in humans. For that reason, patients with pneumonia in whom the lung parenchyma is already damaged by virus itself, this mode of ventilation poses an even greater risk for lung trauma. Barotrauma is one of the most serious complications of mechanical ventilation, which increases morbidity and mortality. MDCT is a reliable diagnostic method for evaluation of these patients, for early diagnosis and optimal therapeutic approach.

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A Severe COVID-19 Patient with High Risk Predisposing Factor from Massive Gastrointestinal Bleeding: A Case Report

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Background: The COVID-19 has been reported to affect the gastrointestinal system with a variety of symptoms, including bleeding. Gastrointestinal (GI) bleeding has been reported in a variable proportion and can be exacerbated by the anticoagulants used to treat its thrombotic sequelae.

Case presentation: An 61 years old male, with bilateral pneumonia caused by SARS-CoV-2 was admitted for hospitalization, 10 days after onset of the symptoms. Clinical progression was registered followed by laboratory and chest X Ray worsening. During hospitalization the patient was treated with oxygen, corticosteroids, antibiotics, anticoagulation and gastroprotective therapy. On the 7th day was registered a significant rise of D-dimer, with CT pulmo-angiography signs of segmental pulmonary thromboembolism. Anticoagulant therapy was corrected, achieving recommended therapeutic dose. Furthermore, on the 10th day, melena and rectorrhagia have appeared, followed by signs of hemorrhagic shock. Emergency endoscopic procedure has shown deep gastric ulcer treated with injection therapy. Histopathology (HP) report has been visualized as neoplastic infiltration at the stomach wall, with involvement of smooth muscles. Tissue changes matched as „high grade sarcoma“. In the further course, total gastrectomy with esophago-jejunal anastomosis was performed. HP analysis was in favor of pseudosarcomatous reaction in granulomatous tissue, with no signs of neoplasia. Control postoperative imaging has shown an active and fully functioning anastomosis.

Conclusion: We describe the clinical case of a patient with COVID-19, who developed hemodynamically significant upper GI bleeding, requiring endoscopic visualization, along with his clinical outcomes. In that course, digestive symptoms could be severe in COVID-19, especially for the high-risk individuals with predisposing conditions.

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High Dose Corticosteroid Pulse Therapy in COVID-19: Metabolic Aspects and Clinical Course in Patients with Severe Pneumonia – A Single Center Experience

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Background: The use of high dose methylprednisolone pulse therapy (MPT) in severe COVID-19 pneumonia is associated with increased survival rates. The aim of this study was to compare the clinical course between diabetic and non-diabetic patients with severe COVID-19 pneumonia treated either with MPT or lower doses of methylprednisolone (LDMT).

Methods: A total of 94 patients were divided into 4 groups based on the dose of methylprednisolone used in their management: (MPT, LDMT) and the presence of type 2 diabetes (T2D-, T2D+). We evaluated differences in mortality, length and type of oxygen support, biochemical parameters and complications between the groups.

Results: Both MPT groups had lower mortality rates than the LDMT groups. T2D-LDMT patients had the highest mortality rate ($p=0.039$). There was no difference in length of hospital stay ($p=0.815$), oxygen therapy use ($p=0.919$), non-invasive ventilation (NIV) use ($p=0.781$), days of NIV use ($p=0.840$), endotracheal intubation requirement ($p=0.293$) and ventilator day count ($p=0.438$) between the groups. The presence of in-hospital complications was an independent predictor of mortality in a multivariate regression analysis with a 11.6 fold risk increase. The AUC-ROC curve demonstrated that the ferritin level of 1001.0 $\mu\text{g/L}$ on admission had a 66% sensitivity and 59.1% specificity in predicting mortality.

Conclusions: According to our study, MPT is superior to LDMT in reducing mortality in both non-diabetic and diabetic patients with severe COVID-19 pneumonia. Prolonged use of LDMT has a negative effect on clinical course and survival rate in diabetic and especially in non-diabetic patients.

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Orthopaedic Trauma Care in Level I Emergency Centre During COVID-19 Pandemic: A Brief Report Of Two-Years Experience

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Background: The skeletal trauma is continuously happening even during COVID-19 era. In fact, the very first patient with COVID-19 in the Emergency Center of the University Clinical Center of Serbia was an orthopedic trauma patient.

Methods: We report our experience in managing orthopedic trauma care in non-COVID orthopedic division.

Results: From March 2020 to March 2022 we have had three COVID-19 epidemic breakouts. Only 7 COVID-19 patients were discovered during initial lockdown, whilst from July 2020 onwards we diagnosed 85 SARS COV-2 infections amongst inpatients. 40 were surgically treated before the detection of disease. Amongst 47 (56,62%) SARS COV-2 positive employees, 20% were infected twice. Staff vaccination rate was 79%. Compared to 2019, the number of admitted patients during March-May 2020 was proportionally diminished by almost 50%, whilst the total annual number in 2020 and 2021 were 6% and 12% higher respectively. The same tendency was noticed in the total number of polytraumatized orthopedic patients that reached 26% of growth in 2021. Total number of surgeries remained almost unchanged, however, with the strong inclination towards more complex, high-energy injuries, and greater number of geriatric hip fractures. An increase in lower limb amputations due to non-trauma causes was also recorded. The incidence of surgical complications and intrahospital mortality rate were slightly above average. **Conclusion:** We feel that, from organizational to surgical points of view, this once-in-a-lifetime pandemic experience changed profoundly our everyday practice.

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Evans Syndrome (Autoimmune Anemia And Thrombocytopenia) Relapse Following Second Dose of Bnt162b2 (Pfizer-Biontech) COVID-19 Vaccine

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Background: COVID-19 RNA vaccines are considered to be safe, with rare side effects. Only several cases of vaccine induced immune thrombocytopenia or immune hemolysis are reported so far. Evans syndrome (ES) is a very rare syndrome characterized by warm autoimmune hemolytic anemia (AIHA) and thrombocytopenia (ITP).

Methods: We report a case of ES relapse after the second dose of BNT162b2 mRNA COVID-19 vaccine in May 2021.

Case Presentation/Results: A 47-year-old man had a history of AIHA, diagnosed in 1995 and successfully treated with glucocorticoids. ITP was diagnosed in 2016 and treated with several therapeutic approaches. Complete hematologic response was achieved by splenectomy. Eight days after Covid-19 vaccination he notices skin and oral mucosa bleeding. Blood tests showed thrombocytopenia ($21 \times 10^9/L$). He was treated with Prednisone. On day 28 after the vaccine, weakness, jaundice and dark brown urine occurred. His laboratory tests showed: Plt $27 \times 10^9/L$, Hb 45 g/L, MCV 116 fL, RBC $1.19 \times 10^9/L$, reticulocyte 10.4%, total bilirubin 106,6 $\mu\text{mol/L}$, direct bilirubin 19,8 $\mu\text{mol/L}$, LDH 633 U/L, haptoglobin $<0,08$ g/L, positive Coombs test, without signs of viral and bacterial infections, underlying autoimmune or malignant diseases. The diagnosis of Evans syndrome was established. After several therapeutic approaches (corticosteroids, azathioprine, intravenous immunoglobulin), his blood count finally improved (Plt $490 \times 10^9/L$, Hb 88 g/L) and he was discharged from hospital on day 40.

Conclusion: Although it is unclear whether this relationship between Covid-19 vaccination and relapse of ES is coincidental or causal, it highlights the need for monitoring and accurate management of possible vaccine life-threatening side effects.

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Newborn SARS CoV-2 Infection

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Background: Covid 19 has become a major public health challenge since 2019. Current literature data suggest predominantly adult infections with scarce evidence of vertical transmission and its consequences on the newborn. Here we present the case of a female patient born in the 38th week of gestational age by vaginal delivery with SARS-CoV-2 infection.

Results: The patient was asymptomatic during the first 3 hours of life when exacerbation began with hypoxemia (89%), fever (38oC) and signs of nonspecific acute respiratory distress syndrome (Silverman score 3). Chest radiography evolved to bilateral ground-glass opacities. Blood samples indicated elevated levels of IL-6, CRP, procalcitonin, D- dimer, ferritin and pro-brain natriuretic peptide. We administered oxygen (40%), meropenem, vancomycin, surfactant, aminophylline, paracetamol and probiotic supplement. Next day, saturation decreased to 70% and we administered 50% of oxygen, dexamethasone, enoxaparin sodium and pentaglobin. At the end of the 4th day, we detected cyanosis, tachypnea, tachycardia, and included higher doses of oxygen (95%). The condition progressed to persistent pulmonary hypertension within Covid-19 acute respiratory distress syndrome. On the 7th day of life, laboratory analyses indicated a “cytotoxic storm” that we treated with tocilizumab, colistin and azithromycin. On the 9th day of life, the newborn died.

Conclusion: We reported this case as the first one with confirmed SARS-CoV-2 infection at the 3rd hour of life and our treatment approach, with the aim to improve the understanding of underlying disease mechanisms and possible treatment options and to urge the need for uniform guidelines for the treatment.

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Structure of Users and Type of Interventions on National Line for Providing Psychosocial Support in the COVID-19 Pandemic

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Background: During the COVID-19 pandemic, mass application of telemedicine began in almost all branches of medicine, with the aim to provide service to patients in compliance to epidemiological measures, and to provide assistance and support to vulnerable groups. The aim of the study was to examine the structure of users and to show the types of interventions on the National Line for Providing Psychosocial Support in the COVID-19 Pandemic, organized by the Ministry of Health and the Clinic for Mental Disorders "Dr Laza Lazarević".

Methods: The study was realized as a retrospective, descriptive study. It included all users of the free national line service in the period from March 16, 2020 to February 16, 2022. Analyzed data were gender and age of the users, residence, and the reason for calling, as well as the type of interventions applied.

Results: The study included 14,685 users, of which 55.2% were females. The mean age of the users was 51.68 ± 15.77 years old. Of the total number of users, almost 55% were from Belgrade. The most common reasons for calling were fear, tension and panic, as well as seeking advice regarding pre-existing mental health problems. The most frequent interventions provided to the users were psychological crisis interventions, as a type of psychological first aid.

Conclusions: Telemedicine for the purpose of mental health protection is very important for the prevention of mental disorders, but also for further development of the strategy for the mental health protection of the population.

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Varicella-Like Exanthema in a COVID-19 Patient Treated at the Clinic For Mental Disorders „Dr Laza Lazarević”: Case Report

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Background: COVID-19 is a multisystem disease accompanied by numerous manifestations. As with other viral diseases, various skin manifestations may be present, from maculopapular eruptions, vascular lesions, to varicella-like lesions. This case report describes the associated occurrence of varicella-like changes in an adult psychiatric patient with COVID-19.

Case report: Forty-five-year-old male patient was examined at the Clinic for Infectious and Tropical Diseases of the University Medical Center Serbia due to fever, weakness, itching and rash in the area of the trunk, which then erupted in bursts on the face and head. PCR test for Sars-Cov-2 infection was positive. Considering the history of chronic psychiatric illness, the patient was admitted for hospital treatment in the clinical COVID department of the Clinic for Mental Disorders “Dr Laza Lazarević”. The mental finding at the patient’s admission was chronic schizophrenic psychosis. Upon admission, elevated values of leukocytes, sedimentation, C-reactive protein and D-dimer were determined. Discrete initial inflammatory changes were observed by radiography of the lungs and heart. Objectively, polymorphic disseminated smallpox in the form of papules, vesicles and crusts was found in the area of the trunk, face and head. He was treated according to the protocol for COVID-19. In the next ten days, the general and mental condition improves, vital parameters are stabilized, and varicella-like exanthema is withdrawn.

Conclusions: Timely diagnosis enables adequate treatment without the development of complications, especially in those patients with associated diseases.

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First-Episode Psychosis in Patients with COVID-19: A Case Series

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Background: During the COVID-19 pandemic it became evident that SARS-CoV-2 has neurotropic and neuroinvasive features and that neuropsychiatric manifestations of COVID-19 are common. However, there is growing evidence suggesting that COVID-19 increases the risk of new-onset psychosis. The aim of this case series was to describe patients with confirmed COVID-19, hospitalized for treatment of first-episode psychosis.

Methods: This case series included all adult patients admitted for hospital treatment in our facility, between December, 2020 and February, 2022, with new-onset psychotic symptoms and confirmed COVID-19, discharged with a diagnosis of psychotic disorder. The exclusion criteria were patients with delirium, psychosis due to substance abuse and another medical condition, as well as premorbid psychotic symptoms and cognitive impairment. The data about sociodemographic and clinical characteristics were obtained retrospectively, from the patients' medical records.

Results: 13 patients fulfilled inclusion criteria. 10 (76.9%) patients were male. The mean age was 43. A total of 7 (53.8%) patients had a family history of psychosis and 10 (76.9%) patients had a comorbid medical condition, mostly arterial hypertension (38.5%). Majority (77%) cases had pneumonia, while 2 (0.15%) cases received oxygen therapy via face mask.

Conclusions: Longitudinal cohort studies on larger samples are needed to examine the influence of COVID-19 on the occurrence of new-onset psychosis.

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Cerebral Venous Thrombosis in COVID-19 Patients

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Background: Coronavirus disease 2019 (COVID-19) has an increased propensity for systemic hypercoagulability and thromboembolism. An association with cerebrovascular diseases, especially cerebral venous thrombosis (CVT), has been reported among these patients.

Method: We report demographic, clinical characteristics and the outcome of 5 patients with COVID-19 and CVT who were treated in our hospital in period from November 2020- January 2021. They all developed profound neurologic injury secondary to cerebral venous thrombosis (CVT), with SARS-CoV-2 infection.

Results: In our case series were 5 patients. The mean age was 78 years (range, 70–89 years; 3 men and 2 woman). There were 3 patients who were clinically presented as intracerebral hemorrhage, one of them as ischemic stroke with subarachnoid hemorrhage and one with ischemic stroke with hemorrhagic transformation. Most of them have a very severe clinical presentation of stroke (range, NIHSS 12-22). Fatal outcome (mRS 6) had 2 of them and poor functional outcome had 2 of them (mRS 5).

Conclusion: Severe and potentially fatal deep cerebral thrombosis may complicate the initial clinical presentation of COVID-19. Incidence of CVT related to COVID-19 is higher than in non-COVID-19- related CVT cases. COVID-19-related CVT is more common among males at older ages when compared to previously reported non-COVID-19-related CVT cases. Functional outcome of CVT in COVID-19- related patients was poor and the mortality was high.

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A Case Report: PTE Complication In COVID-19 Patient

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A 72 year old patient was admitted to the semi-intensive care unit of our Covid 19 Hospital. Upon admission the patient had an MSCT verified pulmonary thromboembolism of lobar, segmental and subsegmental branches bilaterally. In laboratory findings the patient had extremely high levels of D-dimer >80 (cut off 0.5). Patient required increasing levels of oxygen support which culminated with High Flow oxygen support of 80l O₂ per minute through a nasal catheter. CT severity score was 20/25.0

During hospitalization the patient experienced a choking episode in which he coughed up a tissue like mass which got stuck in his oropharynx. After intervention by the medical doctor on call and removal of the foreign body the patient experienced rapid recovery in respiratory function followed by decreasing oxygen support until he was able to maintain good gas exchange and O₂ sat without any respiratory support.

Removed mass with dimensions of 4 by 6 by 3 centimeters was sent as a whole to further pathohistological diagnostics. Results came back as a coagulum filled with fibrin without any signs of organ tissue in it.

It is important to note that during the entire hospitalization, which was 30 days long, there were no signs of bleeding registered in subsequent laboratory results nor were there any signs of airway obstruction on control radiographies of the lungs. Due to having no clinical reasons or indications no bronchoscopy was performed. After careful examination of the case after the patient was discharged, what came as the most likely conclusion of a reason for prolonged high flow oxygen support was the intrabronchial coagulum that was partially obstructing the airways without any chance of being recognized in routine radiological and laboratory check ups.

Topic for discussion: Were there any reasons to suspect creation of a coagulum in the bronchial? If so, how could we set clinical suspicion and indicate further detailed examination?

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Anesthesia for Gynecological and Obstetric Patients with COVID-19 in University Clinical Center of Serbia – Our Experience

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Background: Pregnant women with their fetuses represent a high risk population during the spread of coronavirus disease 2019 (COVID-19), and also may be at higher risk of being infected and developing more complicated clinical events due to maternal physiological changes during pregnancy (1).

Methods: Retrospectively we analyzed clinical condition, types of anesthesia and patient outcome in patients who were tested positive for COVID-19 presented for emergent gynecological and obstetric procedures with various types of anesthesia.

Results: A total of 117 COVID-19 patients presented for emergency gynecological and obstetric procedures. Indications for emergency surgical procedures were: 79 Cesarean sections - 75 in spinal anesthesia, and four in general anesthesia (GA), four ectopic pregnancies (GA), one ruptured cyst (GA), one inflamed myoma (GA), 22 curettages (procedural sedation and analgesia). Also, we performed epidural analgesia for labor in eight pregnant women with COVID-19. Of all 117 patients six of them had signs of COVID-19 pneumonia and they were transferred to COVID hospital. No single member of medical staff was infected in these procedures.

Conclusions: Pregnant women do not appear to be at a higher risk of COVID-19 or suffering from more severe disease than other adults of similar age (4). Both regional anesthesia and general anesthesia for gynecological and obstetric procedures can be considered, but regional anesthesia is preferable in order to lower the risk to the staff. For Cesarean section the first choice should be regional anesthesia, but the general clinical condition of the patient must be considered.

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Clinical Manifestation, Management and Outcomes of Pneumothorax in Patients with COVID-19 – 1 Year Review

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Background: COVID 19 patients can present with a wide range of respiratory complications due to destruction of lung parenchyma, as well as pleural complications such as pneumothorax. Considering pneumothorax in those patients is potentially lethal complication and limited knowledge of lung histopathology in COVID 19, insights into the association between pneumothorax and COVID 19 are important.

Methods: We reviewed the medical history of 120 patients who developed pneumothorax during treatment of COVID 19 infection in COVID hospital University Clinical Center of Serbia between March 2021. and March 2022. We described the demographic, clinical and radiographic manifestation and survival of those patients.

Results: Out of 120 reviewed patients 47,5% were male, 52,5% female, with average age of 67,5 years. In 95 patients diagnosis was confirmed via chest radiography, 25 patients underwent CT scan. Bilateral pneumothorax was presented in 6 patients (0,05%) while in the rest right sided pneumothorax developed 74,6% of reviewed patients, left sided in 25,4%. Average hospital stay was 20,3 days and 11,1 days was average length of hospitalization until development of pneumothorax. All of the reviewed patients were treated with chest tube insertion. Majority of patients at the moment of diagnosis were on MV (60,8%), while 25,8% of patients had no ventilation support and 13,3% were on non-invasive ventilation. The overall mortality rate during hospitalization was up to 74.2%

Conclusion: Pneumothorax is a potentially lethal complication of COVID 19 infection, with effect on higher mortality rates and increased severity of disease, despite all the treatment measures applied.

Key words: Pneumothorax, COVID 19, treatment, outcome

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Perioperative Treatment of COVID-19 Positive Patients with Femoral Bone Fracture- Case Reports

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Background: With the expansion of COVID-19 pandemic, the number of COVID-19 positive patients with femoral bone fracture that require surgical treatment is growing. Perioperative treatment has become a challenge, having in mind the urgency of the surgical intervention, comorbidity, numerous complications due to the infection itself, as well as the ongoing therapy. These patients usually require a thorough cardiac, pulmonary and endocrine evaluation, as a part of the perioperative preparation. Here, we are presenting the perioperative course of two patients hospitalized for trauma induced femoral bone fracture coinciding with a radiographically verified COVID-19 pneumonia.

Cases presentation: Both patients were females, aged over 65 years, with comorbidities, high levels of infective parameters and D-dimer, receiving anticoagulant, antibiotic, corticosteroid and gastroprotective therapy. In the first case the preoperative period was complicated with thyroiditis and newly diagnosed atrial fibrillation. The surgical intervention was postponed in order to stabilize the hormonal status, fearing the risk of a thyroid storm. The second case was a patient with a progressive pneumonia, who developed pulmonary embolism after the hospitalization. The surgical intervention was postponed until stabilization. Postoperative period was complicated by hemorrhage in the left psoas muscle, gluteal muscle and femoral muscle. Thus, the embolization of the gluteal artery was performed.

Conclusion: Patients suffering both COVID-19 and femoral bone fracture have higher perioperative risk. It seems that the greatest challenge, beside thorough preoperative preparation and adjustment of anesthesia techniques, is an appropriate clinical evaluation for the right time of surgical treatment.

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Analysis of Depressive Symptoms in Patients with Severe COVID-19 - Single Center Experience

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Background: COVID-19, a disease that can be transmitted from person to person and with serious health problems, can be associated with mental health disorders. In this study, we analyzed depressive symptoms in severe COVID 19 patients, through the evaluation of clinical characteristics, inflammatory markers, complications and mortality rate.

Methods: A cross-sectional analysis was conducted, which included a cohort of 50 patients with severe COVID 19 pneumonia. All patients were evaluated for depressive symptoms using the Patient Health Questionnaire (PHQ-9). Based on the PHQ-9 score, the subjects were divided into 2 groups, based on the presence or absence of depressive symptoms. We evaluated differences in duration of symptoms, oxygen flow, complications and mortality between groups.

Results: We obtained a statistical difference in the level of C reactive protein (CRP) (p 0.03) and oxygen flow (p 0.01), in the group with COVID 19 and depressive symptoms. Mortality (p 0.04) and complication (p 0.01) rate were higher in patients with COVID 19 and depressive symptoms. However, there was no statistically significant difference according to age, gender, duration of symptoms and presence of comorbidities in the study groups.

Conclusions: Our results showed that patients with severe COVID-19 and depressive symptoms had higher levels of inflammatory markers and oxygen flow during hospitalization. Also, more complications and higher mortality rate were among patients presented with depressive symptoms. These results indicate the need for screening on depressive symptoms in patients with severe COVID 19, in order to prevent adverse outcomes of infection.

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Unusually High Blood Glucose Levels in Covid Patient With Diabetic Ketoacidosis: A Case Report

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Background: It has been reported that the SARS-CoV-2 infection may increase the risk of ketoacidosis (DKA) occurrence in patients with diabetes and can lead to fatal outcomes.

Case description: A 38 years old SARS-CoV2 positive woman with previously diagnosed diabetes mellitus type 1 at age 9 managed with an insulin pump, was admitted to COVID hospital. The patient was in severe condition due to diabetic ketoacidosis with blood PH 7.07, anion gap 42 mmol/L, low sodium and chloride level and extremely high blood glycemia of 138mmol/l. Also, the laboratory revealed elevated CRP 13.5, decreased kidney function, HbA1c 7,3%. She was treated with intensive hydration, bicarbonates and parenteral insulin administration. During the first 24h hours, she received 304 units of insulin to reach desired glucose levels. After achieving stable glycemia her diabetes was managed with an intensive insulin regimen with fast and long-acting insulin analogues. Her COVID was treated with molnupiravir and protocol symptomatic therapy. She was discharged with normal respiratory and kidney function and normal electrolyte levels.

We presented a case where a patient had DKA with unusually high glycemia. DKA is usually accompanied by only moderately increased blood glucose 13,9-33,3mmol/l, and higher blood glucose levels are typical findings in hyperosmolar syndrome. The contributing mechanisms and the long-term effects of the interaction between SARS-CoV-2 and DKA are not yet conclusive.

Conclusion: As we presented in this case report, early diagnosis and early management of both COVID and DKA lead to significantly better outcomes.

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Covid Induced Hyperthyroidism and Atrial Fibrillation in Middle-Aged Female: A Case Report

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Background: According to published reports SARS-CoV-2 could induce or worsen hyperthyroidism in infected patients. Also, atrial fibrillation could be triggered by SARS-CoV-2, especially if hyperthyroidism is present.

Case report: A 65-year-old woman was admitted because of SARS-CoV-2 pneumonia, hip fracture, uncontrolled diabetes mellitus, and newly diagnosed atrial fibrillation. CT scan showed a bilateral pneumonia severity score of 10. Thyroid function was evaluated and it indicated hyperthyroidism (FT4 39.3pmol/L, TSH 0.003 µIU/mL). Additional immunology findings revealed normal values of antithyroglobulin antibodies, TSH receptor antibodies, anti-TPO antibodies. Calcitonin was normal. She didn't have neck pain or difficulty swallowing. Neck CT scan showed heterogeneity and abnormal size of the right lobe of the thyroid gland with calcification and propagation through a thoracic aperture in the mediastinum. She was treated with high-dose propylthiouracil (1200 mg/24 h) and prednisone (20 mg/24 h) but further complicated with infection of *Clostridium difficile* that resulted with extended treatment with high dose antithyroid drugs. COVID pneumonia was treated with antibiotics, oxygen and symptomatic therapy. After prolonged recovery and the resolution of COVID pneumonia, the patient successfully underwent hip surgery. There is compelling evidence in published research articles that the thyroid gland can be a target organ of COVID-19, because of the relatively high concentration of ACE-2 receptors which enable entry of the virus into cells.

Conclusion: because of multiple organ involvement in SARS CoV 2 infection thyroid disease should be considered especially when accompanied by atrial fibrillation. These complicated patients should be managed with a multidisciplinary approach.

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Predictive Value of NEWS2 Score and COVID-19 Severity Index in COVID-19 Patients

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Background: Since the start of the COVID-19 pandemic, doctors have been in search of a prognostic tool to efficiently help identify patients at high risk of severe disease. The aim was to evaluate the effectiveness of the National Early Warning Score 2 (NEWS2) scale and COVID-19 Severity Index (SI) in predicting the in-hospital mortality from COVID-19.

Methods: This retrospective study evaluated 304 patients (162 males and 142 females, 68.9 ± 13.6 years) admitted to the semi-intensive care unit of COVID-19 hospital "Batajnica", University Clinical Center of Serbia. The primary outcome was critical COVID-19 illness defined as death. Accuracy of the scores was evaluated with the area under the receiver-operating characteristics curve (AUC-ROC).

Results: The NEWS2 AUC-ROC measured 0.642 (SE 0.034: 95% CI 0.576 - 0.708, $p = 0.000$) with score 4.5 showing the best sensitivity and specificity for prediction of in-hospital mortality. The COVID-19 SI AUC-ROC measured 0.687 (SE 0.031, 95% CI 0.626 - 0.748, $p = 0.000$) with score 7.5 showing the best sensitivity and specificity for prediction of in-hospital mortality.

Conclusions: Both scales showed comparable AUC-ROC values. However, the NEWS2 cut-off value, 4.5, was lower than the standardized threshold value for urgent response set to 5. The COVID-19 SI threshold of 7.5 was in accordance with its standardized threshold value for urgent response, set between 7 and 8. The NEWS2 score is easier and less time consuming, but it carries a risk of missing patients who need urgent response.

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Cardiac Catheterization Laboratory in Covid Hospital Batajnica- Challenges in Invasive Cardiological Treatment During COVID-19 Pandemic in Serbia

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Background: SARS CoV-2 is a well-documented prothrombotic agent, coronary arteries are one of the most important targets.

Methods: We gathered data reviewing medical documents of 122 patients that were brought to the Cath lab in COVID hospital Batajnica from December 4th, 2020 until March 1st, 2022.

Results: Average age of patients was 66 years. Total number of procedures was 122, out of which 112 were coronary angiograms due to ACS (APNS-6, NSTEMI-21, STEMI-85), 5 pacemaker implantations, 4 pericardiocentesis, 1 peripheral vascular intervention. Out of 112 patients with ACS, 76 proceeded to primary percutaneous intervention (PCI). Out of them 1 patient presented with APNS (1.32%), 10 with NSTEMI (14.47%) and 21 with STEMI (84.21%). In other 36 patients no PCI was performed because of three vessel disease with no obvious culprit lesion responsible for ACS-8 and those patients were referred for heart team evaluation upon recovery from COVID. In 28 cases coronary arteries were without significant stenosis thus optimal medical therapy was continued. Out of these 36 patients 5 presented with APNS (13.85%), 10 with NSTEMI (27.78%) and 21 with STEMI (58.33%). Out of 122 patients 84 made full recovery from both COVID and ACS (68.85%), while 38 deaths were recorded (31.15%), out of which 11 died of cardiogenic shock (9.8%, of total number of ACS)

Conclusion: Even though overall in-hospital mortality of our patients was high the percentage of true cardiovascular deaths was lower. Complexity of COVID as well as its systemic effects worsened the overall prognosis and survival rate for our patients.

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Which Imaging Method is the Most Important Prognostic Tool in Patient with COVID-19?

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Background: The different imaging methods and laboratory parameters are used in COVID-19 to detect the risk patients and improve the treatment of that disease. All available imaging methods are important for certain COVID-19 patients. The use of echocardiography, pulmonary CT and cardiac magnetic resonance (CMR) were widely applicable in COVID-19 centers. The study aimed to identify the most important prognostic tool which could be used in patients with COVID-19 who developed cardiac symptoms.

Methods: The study was conducted in the University Clinical Center of Serbia. All patients underwent clinical examination, laboratory analysis, echocardiography, pulmonary CT and CMR.

Results: Examination included 126 patients with COVID-19, 61 (48%) male, mean age 45±15 years. The symptoms of palpitation, fatigue, shortness of breath and chest pain were obtained. Meantime from the onset of infection to observation was 107 days. The extracellular volume (ECV) quantification by CMR was significantly higher in patients with fatigue (22.6±3.8 vs. 19.7±5.2%, $p=0.010$). By echocardiography, the ejection fraction of the left ventricle (EFLV) was significantly lower in patients with shortness of breath (62±6 vs. 67±6%, $p=0.025$). The CT severity score index was not significantly higher in patients with fatigue after acute infection (21.0±8.1 vs. 10.1±5.1, $p=0.060$). Brain natriuretic peptide (NTproBNP) was not higher in patients with palpitation (39.4±9.1 vs. 19.2±9.4 pg/ml, $p=0.075$).

Conclusions: COVID-19 may cause cardiovascular complications in a significant percentage of patients. Imaging tools such as echocardiography and CMR are the most important in risk stratification and optimal therapeutic strategies in these patients.

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First Case of COVID-19 Viral Pneumonia on Neurosurgery Clinic, University Clinical Center of Serbia, Belgrade

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We'll describe the first case of COVID 19 bilateral viral pneumonia diagnosed at Neurosurgery Clinic, University Clinical Center of Serbia, Belgrade.

A 72-years old female was admitted to our clinic after an examination in the Emergency Center. She was unstable while walking with drift. A CT scan of the brain showed a tumor of the occipitotemporal part of the brain with compression on the right lateral ventricle. After the CT scan, an MRI examination was done. It confirmed the presence of tumor, suspected glioma with perifocal edema. After a fast serological blood test which has shown no antibodies in the blood, the patient was admitted to our clinic. She was conscious and with spontaneous breathing on admission, without allergies. She had hypertension and high blood cholesterol level in the blood, with previous total hysterectomy and cholecystectomy.

6 days after admission she was underwent to surgery- total removal of expansive lesion in general endotracheal anesthesia. After surgery, she was conscious and hemodynamically stable, without motor deficit. She was started normally walking. Her postoperative CT scan of the brain was satisfactory. 6th day after surgery, patient became somnolent and drowsy, with cyanotic fingers and toes, slightly dyspneic. Her control CT scan of the brain was without changes, but her chest X-ray showing bilateral pneumonia. Her peripheral oxygen saturation on oxygen mask (15l/min) wasn't more than 66%. WBC were 7.2 and Ly 5.1%. CRP was 153.8. Her serological SARS-CoV2 test was negative. But her PCR test of nasopharyngeal swab was positive. Antibiotic treatment with Ceftazidime and Azithromycin was initiated. After positive PCR test result, patient was transferred to specialized covid hospital.

This was the first case of COVID 19 bilateral pneumonia diagnosed at Neurosurgery Clinic. It happened at the end of June 2020, 3 and a half months after the first case diagnosed in Serbia.

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COVID-19: Comparative Analysis of Responses of European Health Resources in the Field of Mental Health

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In accordance with expected effects of psychological distress and other influences of pandemic on mental health, based on past experiences of mass infection in the 21st century (SARS 2003), WHO has pointed out mental health protection as key domain in respect to health system response to Covid-19. Pandemic, among others, has brought the need for prompt and flexible adjustment in organization of mental health services. The Serbian Psychiatry Association has taken an active role in monitoring professional guidelines implementation in treating people with mental health problems, and at the same time identifying possible problems in management of the mental health system in Serbia. Participation in European Psychiatry Association study enabled comparative analysis of responses and, as well, comparison of health systems in Europe in provision of services in the mental health domain. The questionnaire data was collected from 857 psychiatrists from 40 European countries on clinical experience of Covid-19 impact on treating psychiatric patients at the beginning of pandemic (April, 2020.), and results indicate significant difference in health service provision and in organization approach modality. According to different national psychiatry association recommendations and research results, significant organization aspects of mental health protection have been identified during the first Covid-19 wave, providing the terms for improvement and promotion of different parts in the system of mental health protection in the future course of pandemic.

Key words: pandemic, covid-19, mental health

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Metabolic Associated Fatty Liver Disease (MAFLD) is an Independent Risk Factor for Poor Outcome and Severe Form of COVID-19

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Background: Metabolic associated fatty liver disease (MAFLD) integrates a wide range of liver disease phenotypes and includes metabolic and systemic dysfunction. SARS-CoV2 virus has been proven to cause systemic inflammation. Our aim was to assess the influence of MAFLD on COVID-19 severity and its outcome.

Methods: A retrospective study was conducted, including 130 patients, divided into two groups, group A (MAFLD) and group B (non-MAFLD). MAFLD diagnosis was made using criteria set by an International Consensus Panel. Assessed data included demographic, anthropometric parameters, comorbidities, vital parameters, and biochemical analysis. COVID-19 severity and liver fibrosis were assessed using NEWS2 and FIB-4 scores (respectively). COVID-19 outcome was regarded as discharged patients, mechanical ventilation (MV) need and non-survivors.

Results: MAFLD prevalence was 42%, mortality rate was 14%, 67% patients were discharged, and 19% needed MV. MAFLD patients were significantly older ($p<0.05$), had higher BMI ($p<0.05$), CRP ($p<0.001$), IL-6 ($p<0.05$), SBP (systolic blood pressure) ($p<0.05$). MAFLD was associated with more prevalent type 2 diabetes ($p=0.035$) and hypertension ($p<0.05$). NEWS2 score was significantly higher among MAFLD patients (6.5 ± 0.5 vs 3 ± 1.0 , $p<0.05$). MAFLD presence was associated with higher mortality rate ($p<0.01$) as well as the presence of advanced liver fibrosis ($p<0.05$). Multiple regression analysis showed that MAFLD is a statistically independent risk factor for inhospital mortality (OR 3.5 (95% CI) 4.0-7.5, $p<0.05$)).

Conclusion: It is important to put an emphasis on MAFLD as one of the modifiable risk factors for severe COVID-19 in order to ameliorate MAFLD-related inflammatory state that contributes to poor COVID-19 outcome.

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Metabolic Control in Diabetes: The Effect on Onset and the Clinical Course of COVID-19

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Background: Diabetes is emerging as a risk factor for coronavirus disease (COVID)-19 prognosis. However, contradictory findings have been reported regarding the impact of metabolic control on COVID-19 outcome. The aim of this study was to analyze the impact of values of HbA1c at hospital admission on COVID-19 mortality or worsening in patients with type 2 diabetes (T2D).

Methods: This was a retrospective study of COVID-19 patients who underwent an HbA1c test. Their demographic data, medical history, signs and symptoms of COVID-19, laboratory test results, and final outcomes of COVID-19 treatment were collected and analyzed. According to at-admission HbA1c patients were divided into 3 groups: optimal (A: HbA1c less than 7%), intermediate (B: HbA1c 7-9%), and poor (C: HbA1c more than 9%) metabolic control.

Results: Both B and C groups had higher mortality rates than the A group. T2D patients with intermediate metabolic control had the highest mortality rate ($p=0.04$). Regarding complications, the highest rate was in the intermediate group ($p=0.01$). There was no significant difference according to age ($p=0.918$), gender ($p=0.733$), duration of symptoms ($p=0.644$) and presence of comorbidities ($p=0.629$) between the groups.

Conclusions: Prolonged uncontrolled hyperglycemia increases the risk of adverse prognosis in COVID-19. Patients with higher HbA1c should be monitored intensively to minimize the risk of adverse prognosis in COVID-19.

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Results of Innovative COVID-19 Treatment Approaches in Patients with Acute Leukemia

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Acute leukemia can severely impair normal immune response, cause immunodeficiency, and leave patients more susceptible to infections. It was previously shown that patients with hematological malignancies can maintain prolonged seropositivity to covid-19, and develop reinfections. Recent approvals for antiviral agents and monoclonal antibody based medications for treatment of covid-19 present a possible way to help immunodeficient patients overcome COVID-19.

The study included 74 patients with acute leukemia and confirmed COVID-19, hospitalized between 04.2020. and 02.2022. They were separated into groups based on whether they did or did not receive antiviral medication (favipiravir, molnupiravir, remdesivir) or anti-covid mAbs (casirivimab and imdevimab) and the outcome of their hospitalization was observed. All patients received standard covid-19 therapy in accordance to the national guidelines.

Out of 12 treatment group patients, 3 received casirivimab and imdevimab, 3 remdesivir, 4 favipiravir, 1 molnupiravir, and 1 casirivimab and imdevimab followed by remdesivir. Overall mortality rate was 32.4% (95% CI 21.8-43.1%), and mortality rates in the group with innovative therapy and the control group was 25% (95% CI 0.5-49.5%) and 33.9% (95% CI 22.1-45.6%) respectively. For $p=0.05$ there is no statistically significant link between mortality rate and covid therapy.

Results of this study show no statistically significant link between the use of these therapy approaches and the survival rate of covid patients with acute leukemia. However, given the relatively small sample size of the treatment group further study is needed to more conclusively confirm or deny potential advantages of using such treatment in patients with AL.

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Variability of Pulmonary Thromboembolism Presentations in the Recovery Phase from COVID-19 and those after Oligosymptomatic Forms of the Disease

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Background: It is well known that the occurrence of thrombotic complications, especially pulmonary thromboembolism, in the acute phase of treatment of patients with COVID-19 significantly affects the outcome of treatment of patients. The professional public is concerned about the significant number of patients with various forms of presentation of pulmonary embolism in patients with COVID-19, but not only in those with severe disease, but also in those with asymptomatic or oligosymptomatic forms.

Objective: to draw attention to the occurrence of variable presentations of pulmonary thromboembolism in order to timely identify and apply adequate diagnostic and therapeutic procedures in POST-COVID-19 patients and oligosymptomatic COVID-19

Methods: Standard clinical, biochemical, echocardiographic, radiological and scintigraphic methods

Results: We present with special care a 55-year-old patient who felt pain and swelling of the left lower leg 2 days after discharge, dyspnea after 4 days from hospital discharge and recovery from treatment with COVID-19 pneumonia, with diagnosis of massive embolism, treated with rTPA thrombolytic therapy. As a special case, we point out a 39-year-old patient who developed a clinical picture of massive pulmonary embolism 7 days after home treatment of oligosymptomatic COVID-19, which was treated with

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thrombolytic therapy. On the other hand, we present a 67 - year - old patient who developed an atypical form of pulmonary thromboembolism in all segmental branches of the right pulmonary arterial trunk after 3 months of COVID-19 treatment. We also present scintigraphically confirmed pulmonary embolism after oligosymptomatic COVID-19, as well as pulmonary embolism in patients with a positive epidemiological history and asymptomatic form of COVID-19.

Conclusion: COVID-19 is an acquired thrombophilic condition that can lead to the development of life-threatening forms of pulmonary thromboembolism in POST-COVID 19 patients, even 3 months after infection. We emphasize possible occurrence of significant pulmonary embolism in oligosymptomatic or asymptomatic COVID-19 forms.

Single Centre Experience with COVID-19 During First Wave in Hemodialysis Unit: Many Questions a Few Answers

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Background: Outbreak of COVID-19 disease started in December 2019th in China and spread all around the world. Hemodialysis (HD) patients visit HD centers three times per week and therefore represent possible vector for both virus transmission and spread.

Methods: Our Center was transformed into COVID-Hospital and therefore 150 patients were dislocated. The first patient with COVID-19 was diagnosed by epidemiologic suspicion, asymptomatic female who informed us that her husband was admitted to COVID-hospital as SARS-CoV-2 positive.

Results: We tested two patients who shared the same transport to dialysis Center and one of them was also positive. Although other patients were asymptomatic, we tested serum of all patients and medical staff, looking for IgM and IgG antibodies for SARS-CoV-2 and in 4 patients IgM anti-SARS-CoV2 antibodies were detected (2.7%). At the same time RT-PCR was performed and came negative. All medical staff was tested and both serology and RT-PCR were negative. IgM positive patients were closely followed and isolated from the other HD population.

Conclusion: It is very difficult to keep away COVID-19 out of hemodialysis (HD) centers since this infection is asymptomatic in some patients. Even though, they may spread infection that could be fatal for other patients, including medical staff.

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Complete Blood Count and Common Biochemical Markers' Prognostic Value on COVID-19 Progression in Patients With Hypertension

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Background: The study aimed to assess the prognostic value and correlation of biochemical and complete blood count parameters at hospital admission with progression of COVID-19 in patients with hypertension (HTA).

Methods: Data from 829 patients hospitalized with COVID-19 at the University Clinical Center Nis were processed. Patients were divided into a control group and group of HTA patients. Disease progression was defined as lethal outcome or transfer/admission to an intensive care unit. The predictive value of parameters that were significantly associated with poor outcome was estimated by ROC analysis.

Results: There were 466 subjects (56.2%) with HTA and 363 (43.7%) controls. The average age was 66 and 70.5 years, respectively. Disease progression was observed in 39.5% of patients with HTA and 44.4% controls. The ANOVA test showed a significant relationship between disease progression and LDH activity ($p=0.000$), ferritin concentration ($p=0.003$), D-dimer ($p=0.049$) and neutrophil-lymphocyte ratio ($p=0.008$) in both groups. In patients with HTA, CRP ($p=0.011$) and neutrophil count ($p=0.001$) were highlighted, and in controls monocyte-lymphocyte ratio ($p=0.01$). ROC analysis showed the best results for LDH (AUC=0.67 and 0.64). LDH sensitivity and specificity were 62.4% and 54.9%, at 780U/l in patients with HTA and 60.9% and 67.1% in controls. By logistic regression, LDH>780U/l was a significant prognostic factor for progression in patients with HTA, with a probability of 2.72 times compared to controls (95%CI:1.26-5.85, $p=0.011$).

Conclusion: LDH activity upon hospital admission showed the greatest prognostic significance in patients with HTA. The possibility of progression was 2.72 times higher when LDH exceeded 780U/l.

Keywords: COVID-19, LDH, hypertension, complete blood count, CRP, D-dimer

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Diarrhea in COVID-19

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Introduction: One of the most common digestive symptoms in Covid 19 is diarrhea. The virus enters the digestive tract and get into the cells of the intestinal epithelium. This leads to reduced regulation of the activity of AC-2 receptors, which causes damage to the intestinal barriers. The activity of these receptors is directly related to the maintenance of the intestinal microbiota, which is an irreplaceable factor in maintaining immune homeostasis in the intestinal tract.

Material and methods: The study included 972 patients hospitalized in the Covid Hospital of the University Clinical Center in Niš in the period from 10.09.2021. - 10.01.2022. with CoV-SARS2 infection proven by antigen or real-time PCR test.

The results: Out of the total number of 972 hospitalized patients, 518 or 53.29% were male, and 454 or 46.70% were female patients. The average age of male patients was 58.5 years, and female 64.2 years. Out of the total number of patients, 172 patients had diarrhea at the moment of hospitalization, of which 84 or 48.83% were men and 88 or 51.16% women. One part of the patients were tested for Clostridium difficile toxins due to frequent, diarrheal stools during hospitalization. Out of a total of 972 hospitalized patients, a total of 46 or 4.73% were tested for clostridial toxins, 22 men, or 2.26% and 24 women, or 2.46%. The total number of proven clostridial infections was only 13 male patients or 1.33% and 16 female patients or 1.64%.

Conclusion: The role of viral colonization of the intestinal mucosa and consequent diarrhea occurs significantly in patients with Covid 19. In addition, the occurrence of clostridial infection expected in patients treated with antibiotics also contributes to the aggravation of clinical pictures of Covid 19.

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COVID-19 in CLL/SLL Patients - A Case Series

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Background: CLL/SLL patients are usually elderly people, with comorbidities, and a secondary immunodeficiency, which makes them prone to the SARS-CoV2 infection, and the development of a severe clinical form of COVID-19, with an uncertain outcome. Since CLL/SLL is the most common haematological malignancy, doctors who treat COVID-19 inevitably meet such patients in their practice.

Methods: We have presented a case series of CLL/SLL patients in order to illustrate clinical features, the course, and the outcome of COVID-19. In this series we have presented 6 patients (3 females and 3 males) that were treated at our clinic, and the Covid-hospitals of University Clinical Center Niš in the last two years.

Results: The age of presented patients was in a range between 52-78 years. At the time of the infection two of our patients were assigned to watch & wait, while three patients got infected during their haematological treatment. One of our patients was diagnosed with CLL/SLL during the treatment of COVID-19. Most of presented patients (5/6) had comorbidities, and half of them were smokers. Most of them (4/6) developed a severe clinical form of COVID-19, while two of them died from COVID-19.

Most of presented patients (5/6) were not vaccinated against SARS-CoV2.

Conclusions: The presented case series provides insight into the heterogenous nature of COVID-19 course in CLL/SLL patients, emphasizing the importance of a personalized and multidisciplinary approach in the treatment of COVID-19, as well as caution in predicting the outcome using the generally established COVID-19 risk factors.

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The Relationship Between High-Sensitivity CRP and Lymphocytes is a Useful Diagnostic Marker in Estimation of Patients with COVID-19

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Background: Coronavirus disease 2019 (COVID-19) is an infectious disease caused by coronavirus 2 (SARS-CoV-2) in which clinical laboratories play an important role in diagnosing, estimating and monitoring patients with COVID-19. In routine diagnostics, it is necessary to find biomarkers that are sensitive and specific enough to evaluate the severity and worsening of the disease, and easy to determine.

Methods: In 264 patients hospitalized in the University Medical Center Nis, standard hematological, biochemical and hemostasis parameters were determined 5-7 days after the onset of symptoms. Patients were divided into three groups: group 1. "mild" patients without bilateral pneumonia; group 2. patients with bilateral pneumonia and group 3. patients treated in intensive care units.

Results: The results of laboratory parameters show statistically significant differences in the values of high-sensitivity CRP (hsCRP) and lactate dehydrogenase (LDH) activity in groups 2. and 3. ($p < 0.05$) in relation to group 1. "mild patients". However, there are no statistically significant differences between groups 2. and 3., between "moderate patients" and those whose blood was taken before the disease worsened and relocated to the intensive care unit. In contrast to traditional individual parameters, using the LDH / #lymphocyte index and especially hsCRP / #lymphocytes, significant statistics of differences ($p < 0.05$) were observed with higher sensitivity and specificity (AUC - 0.82; AUC -0.90 retrospectively) than all determined individual parameters.

Conclusion: The use of some relationships significantly increases the sensitivity and specificity of the tests and represent superior prognostic markers in patients with COVID-19 compared to markers taken individually.

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Case of a Spontaneous, Low-Flow, Indirect Carotid-Cavernous Fistula as an Ophthalmological Manifestation of COVID-19

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Background: Here we present an interesting case of a spontaneous, low-flow, indirect carotid-cavernous fistula (CCF) secondary to COVID-19 infection.

Case report: A 75-year-old man was referred to the University Clinical Centre of Serbia Eye Hospital in November 2021 due to the acute visual loss followed by ophthalmoplegia and increasing eyelid swelling in the right eye (RE). He was previously treated elsewhere for 10 days under diagnosis of unilateral conjunctivitis but was found to be nonresponsive to prescribed Dexamethason-Neomycin eye drops. Previous head or eye trauma was not reported. However, he had a history of poorly controlled systemic arterial hypertension, diabetes and a triple bypass surgery. He had COVID-19 pneumonia in October 2021. Upon admission, he underwent a complete ophthalmological examination and diagnosis. BCVA was 20/20 in the left eye, with no light perception in the RE. There was both upper and lower eyelid swelling followed by upper eyelid ptosis, conjunctival chemosis, restricted eye movements in all directions of gaze and proptosis in the RE. Relative afferent papillary defect was also positive in the RE. CTA scans did not show an obvious fistula, however diffuse atherosclerotic changes in a form of alternating segmental dilatation and stenosis located in both intra and extracranial parts of ACI were described. At a 3-month follow up examination, a resolution of proptosis with a gradual improvement in ophthalmoplegia were present, however visual loss remains.

Conclusion: This case illustrates that CCF may develop spontaneously during COVID-19 infection due to more frequent thrombotic complications related to COVID infection.

Key words: CCF, COVID-19, thrombotic complications, early diagnosis

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The Fluorescence of Hair, Nails and Ocular Surface in COVID-19 Patients Following Favipiravir Treatment

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Background: Favipiravir is one of the medications currently approved for the treatment of COVID-19. The aim of our study was to present the fluorescence of nails, hair and ocular surface in patients who have received favipiravir for COVID-19 and to compare them with those who have received other drugs such as molnupiravir and remdesivir.

Case reports: The fluorescence was investigated under ultraviolet light (365 nm wavelength). The main ingredient though to be responsible for the fluorescence of favipiravir is titanium dioxide. The fluorescent parts of the nails were proportionally elongated with the drug initiation time. Greenish fluorescence starting from the lunula and a nail plate portion near proximal nail fold was observed in two patients who have used the drug recently (Case 1 and 2), while in those who have received favipiravir over a month ago fluorescence could be observed in the middle portion of the nail plates with no fluorescence on the proximal part of the nail plates (Case 3 and 4). Green fluorescence could also be observed on the hair of patients treated with favipiravir. Previously reported ocular surface changes were not observed. No fluorescence was observed on the nails, hair and ocular surface in patients who have received molnupiravir or remdesivir.

Conclusion: Considering the fact that this substance accumulates in the tissues such as hair and nails, we should be careful when prescribing favipiravir especially for patients with known history of kidneys and liver dysfunction since they are among main targets of this medicine.

Key words: COVID-19, favipiravir, fluorescence, UV-A

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Invasive Pulmonary Aspergilosis Associated with COVID-19 in Patients with Chronic Lymphatic Leukemia

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Background: Patients with hematological malignancies (HM) and covid-19 have a high risk of developing superinfections, including invasive pulmonary aspergillosis (IPA). We present a patient with IPA associated with covid-19 pneumonia in a patient with chronic lymphocytic leukemia (CLL).

Case report: The patient is a 76-year-old man who was admitted to the hematology department with covid-19 pneumonia. The patient was diagnosed with CLL in 2003. There were no indications for chemotherapy until 2015 when treatment with R-FC protocol was initiated. The patient was diagnosed with pulmonary tuberculosis (*Mycobacterium xenopi*) in 2020 and was treated with a 4-drug regimen. A month before admission due to covid-19 pneumonia, CLL progression was registered and chemotherapy was required. However, in December 2020 the patient was diagnosed with covid 19 pneumonia. As a result, hematological treatment was delayed. On admission, bilateral pneumonia (score 14) was registered with increased inflammatory parameters and markedly reduced immunoglobulin values. After prolonged fever, IPA was diagnosed. Voriconazole and intravenous immunoglobulins were administered, after which a decrease in fever and in inflammatory parameters were registered. After four weeks of hospital treatment, PCR positivity to covid-19 was maintained, which prevented the treatment of CLL in a non-covid institution. Six weeks after discharge, the patient was re-hospitalized in our institution due to high fever and maintenance of PCR positivity to covid-19, which was resolved by the use of remdesivir.

Conclusion: In all patients with covid-19 and CLL or other HM, it is necessary to look for potential bacterial or fungal infections, especially in patients with active hematological disease.

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Effectiveness of the Tocilizumab Treatment in COVID-19: a Single Center Experience

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Background: Tocilizumab (TCZ), a monoclonal anti-interleukin-6 (IL-6) antibody, has recently emerged as an alternative therapy for COVID19 patients who are at risk of cytokine storms. The therapeutic response of TCZ therapy in COVID19 infected individuals was investigated in this study.

Methods: This retrospective analysis included COVID-19 infected patients who were treated with TCZ at the Clinic for Infectious and Tropical Diseases, University Clinical Center of Serbia, from November 1, 2020 to March 1, 2021. Before and after TCZ therapy, the demographics, treatment, laboratory parameters of C-reactive protein (CRP) and interleukin-6 (IL6), and clinical result were all evaluated retrospectively. In all of the patients, the TCZ was taken in combination with methylprednisolone. The TCZ was given to all of the patients twice.

Results: This research includes a total of 205 participants with COVID-19. In total, 30% of patients were moderately ill, 55% was seriously ill, and 15% was critically ill. Before starting TCZ therapy, all patients' CRP levels were substantially over the normal limit, but they quickly improved following treatment. The value of CRP on the 7th day after TCZ therapy was considerably lower than before TCZ therapy, dropping from 173.6 (9.3-445.2) mg/L to 10.7 (1-117.2) mg/L ($P < 0.01$). During the weeklong period, CRP levels in 19 (9.2%) of the patients did not decrease. Within one week, CRP levels in all other patients were in or near normal range. The usage of TCZ is indicated in treatment of COVID-19 when IL6 levels are elevated. The levels of IL6 before TCZ administration ranged from 20.4 to 922.5 pg/mL. After starting TCZ therapy, serum IL6 level in 36 (17.5%) patients tended to spike shortly in first 24h and then decreased. The general clinical condition, including fever, dyspnea, oxygen saturation, and cough, improved statistically significantly after 7 days of TCZ therapy. Despite

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the fact that TCZ is effective in reducing inflammatory activity, 38 (18.5%) severely sick patients who got TCZ medication died.

Conclusions: Tocilizumab enhanced survival and other clinical outcomes in hospitalized COVID-19 patients. These advantages were evident independent of the level of respiratory assistance and were in addition to the systemic corticosteroids' advantages. In COVID-19 patients at risk of cytokine storms, TCZ appears to be an effective therapy choice.

Keywords: COVID-19; Tocilizumab; Treatment; Outcome; Mortality.

CT Appearance in Patients with Coronavirus Disease 2019 (COVID-19) in Serbia

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Miodrag Lalosevic¹, Perica Adnadjevic¹, Lejla Hajdarpasic¹

Background: The coronavirus 2019 (COVID-19) disease primarily affects the respiratory system, so radiological diagnosis has been shown to be necessary. Chest computed tomography (CT) has been proven to be the best modality in suspected COVID-19 cases for initial evaluation because CT findings may be present before the onset of symptoms.

Methods: This prospective cohort study analysed 321 patients with confirmed COVID-19, which were treated in the Hospital "Dr Dragiša Mišović – Dedinje", between January and March 2020. All patients included in the study underwent chest CT. The patient and clinical data and laboratory examination results were collected for the entire group and analysed.

Results: In our study male sex was dominant. The average age of all patients was 52.37 ± 15.36 . All patients had symptoms at the onset of the disease, of which the most common was fever, present in 86.4%. The main haematological findings were a decreased erythrocytes count (20.3%), decreased haemoglobin (21.8%) and increased ferritin (70.9%). In 93.6% patients the CT findings were positive. The lesions on CT were bilateral in 87.6%, localized both peripheral and centrally in 63.3% of patients, and occurred more frequently in posterior areas (93%), as well as in lower lung zones (91.2%). The average total severity score was 11.00.

Conclusion: CT has proven to be a very important diagnostic method, and its ability to show the distribution, shape, degree of involvement, as well as typical radiological characteristics together with clinical and laboratory findings contributes significantly to decision-making on further treatment.

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Outcome of Sternum Fixation in a Patient with Multiple Comorbidities and COVID-19

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Background: COVID-19 is infectious disease caused by SARS-CoV-2 virus. The results of current research show a high mortality of patients infected with this virus who have undergone cardiac surgery.

Case report: A 64-year-old patient with multiple comorbidities-unstable AP, AF, St. post STEMI, HTA, obesitas, DM II, underwent surgical refixation of sternum due to the deep sternal wound infection at COVID hospital Batajnica. The patient had PCI, but despite this, developed STEMI of the inferior wall. At Clinic of Cardiac Surgery UCCS off-pump CABG No.I LIMA-LAD was performed, according to recoronarographic result. The operative course went well, while the postoperative course was complicated by recurrent left-sided pleural effusions, treated with outpatient drainage, diuretic and AB therapy. Further postoperative course was complicated by dehiscence of sternum, local purulent fistula and X-ray verified right-pleural effusion. Planned Robiscek procedure was performed in COVID hospital Batajnica, due to the positivity of RT-PCR test for SARS-CoV-2. Immediately after the patient was in good general condition, hemodynamically stable, but massive interstitial pneumonia was verified on X-ray. The postoperative course was uneventful. Despite the multidisciplinary approach, the patient's condition rapidly deteriorated leading to lethality.

Conclusions: Sternum dehiscence is a rare cardiac surgical complication. Factors such as HBI, DM, high BMI score, CABG, increase the risk of dehiscence. Studies show that early detection and aggressive therapy lead to improved treatment outcomes in patients with sternal dehiscence. We are of the opinion that COVID infection further complicated the course in an already critical patient, and led to a lethal outcome.

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Incidental Chest Computed Tomography Findings in SARS-CoV-2 Infection

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Background: The purpose of this study was evaluation of intraparenchymal incidental findings in chest Computed Tomography (CT) performed primarily concerning bilateral interstitial pneumonia. This study was performed in a single center, retrospectively with „low dose“ native CT scans of previously confirmed Sars-Cov-2 infection from March 2020 to April 2021.

Methods: The „low dose“ native CT scans were obtained using the Canon Aquilion One (TSX-301C), 320 row MDCT System (Canon, Tokyo, Japan).

Results: Of the 8275 patients, 422 (5,09%) had an incidental finding. Among the patients with incidental findings, there was 227 (53,79%) men, and 195 (46,21%) women, with the average age of 58,7. The most common incidentaloma were pulmonary nodules (56,4%), followed by calcifications (18,96%), tumors (13,98%), and the rest were comprised of less than 10% - undefined parenchymal hyperdensities, bullae, secondary deposits, fibrous bands, and abscesses. This study detected 59 previously unrecognized tumors, of which 55 (93,2%) were suspicious of malign characteristics, and 4 (7,4%) were benign. Also, 16 (3,79%) of all incidental findings) nodular changes indicating of lung metastases were detected.

Conclusion: The results have shown that there was a significant number of incidental findings in this time period in our hospital, allowing more efficient further evaluation and treatment options because of the early detection.

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Prognostic Parameters of In-hospital Mortality in Patients with COVID-19 - Single Centre Experience-

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Introduction: The most common indications for the hospital treatment of patients with COVID-19 were hypoxia, CRP value, severity of pneumonia and age. The aim of this work was to analyze potential predictors of mortality in hospitalized patients with Delta variant COVID-19, who were mostly older than 65 years, and unvaccinated.

Methods: We performed an analysis of 134 consecutive patients with confirmed Delta variant COVID-19 admitted to the semi-intensive care unit 4 in University Hospital Batajnica, Belgrade, between September 15, 2021 and October 25, 2021. Demographic data, past medical history, laboratory values, and CT severity score were analyzed to identify predictors of mortality. Univariate and multivariate logistic regression models were used to assess potential predictors of mortality in hospitalized COVID-19 patients.

Results: The mean patient age was 60.1 years (range, 24-93 years), predominantly men, 61.9%. Comorbidities were present in 55.6% patients with hypertension (32.8%) as the most frequent. Almost all patients (94.8%) needed oxygen support, 12.7% patients were on invasive mechanical ventilation, 17.9% on noninvasive, and 20.9% on high flow oxygen therapy machine. The median CT score was 14 (25th to 75th percentile: 11-17), 38.8% of patients experienced complications during hospital stay (6% PTE, 3.7% ARDS). The median total number of hospital stay was 15.5 days (25th to 75th percentile: 11-21). The mortality rate was 15.7% (21/134). Univariate logistic regression analysis identified age, presence of comorbidities, invasive mechanical ventilation, severity of pneumonia and CRP to albumine ratio (CRP/Alb) as significant predictors of mortality. Age ($p=0.010$, invasive mechanical ventilation ($p=0.009$), severity of pneumonia ($p=0.033$) and CRP/Alb ($p=0.002$) were significantly associated with mortality in the final multivariate analysis.

Conclusion: Several potential predictors of mortality in hospitalized COVID-19 patients were identified in this study. The CRP/Alb ratio may be a promising prognostic biomarker for risk stratification and clinical management of patients with COVID-19.

Key words: COVID-19, severity, predictors of mortality

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C-Reactive Protein, Ferritin and D-Dimer as Predictors of Disease Severity in COVID-19 Patients

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Background: COVID-19 is a multisystemic disease whose pathogenesis includes a number of inflammatory and coagulation factors. The aim of the study was to examine the significance of C-reactive protein, ferritin and D-dimer levels as predictors of disease severity in COVID-19 patients.

Methods: The study included 53 patients (33 males, 20 females) hospitalized at The University Clinical Center Nis, divided into two groups: presenting with moderate (29) and severe disease (24). The C-reactive protein, ferritin and D-dimer levels were evaluated on day one, seven and fourteen of hospitalization. Data are presented as arithmetic mean with standard deviation, absolute and relative numbers, and statistical processing was performed using ANOVA Repeated Measures, Mann-Whitney, Chi-Square, Fisher's test and Univariate logistic regression analysis with p value <0.05.

Results: The mean age of patients is 60.10±14.57 years (30-89 years). CRP levels decrease statistically significantly during the follow-up period (p<0.001) and there is a statistically significant difference (p<0.01) between all three measurements. D-dimer levels change statistically significantly over a period of 14 days (p=0.004), decreasing after the seventh day (p=0.003). The difference in ferritin levels is not statistically significant. Ferritin and D-dimer levels after day seven are statistically significantly higher in patients with severe disease (p=0.006 and p=0.017, respectively) and could be considered predictors of disease severity (OR 1.002, p=0.017; and OR 1.001, p=0.016, respectively).

Conclusions: C-reactive protein and D-dimer levels are important for monitoring the course in the disease, while ferritin and D-dimer levels could be used as predictors of disease severity in COVID-19 patients.

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The Importance of Monitoring the Leukocyte Differential Count and Neutrophil-to-Lymphocyte Ratio in COVID-19 Patients

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Background: Leukocyte differential count is amongst routine laboratory analyses, and provides insight into the degree of systemic inflammatory response. The aim of our study is to assess leukocyte, neutrophil and lymphocyte counts, and the neutrophil-to-lymphocyte ratio (NLR) as prognostic factors in hospitalized patients with COVID-19.

Methods: The study included 53 patients (33 men, 20 women) treated for COVID-19 at the University Clinical Center Niš, divided into two groups – with moderate (29) and severe disease (24). The absolute leukocyte and differential counts were monitored and NLR was calculated on day one, seven and fourteen of hospitalization. Statistical analysis included the ANOVA Repeated Measures, Mann-Whitney, Chi-Square, Fisher's test and Univariate logistic regression, in the software package R and RStudio.

Results: The leukocyte count changed statistically significantly over 14 days ($p < 0.001$), increasing on day seven ($p < 0.001$). The leukocyte and neutrophil counts were statistically significantly higher ($p = 0.017$ and $p = 0.010$, respectively), while the lymphocyte count was significantly lower in patients with severe disease on day seven ($p = 0.008$). NLR changed during 14 days ($p = 0.011$), decreasing between day seven and fourteen ($p = 0.008$), and is significantly higher in patients with severe disease on day seven ($p = 0.001$). Leukocytes above $12,05 \times 10^9/L$ and NLR above 9.5 on day seven are predictors of disease severity (OR 1.178, $p = 0.015$; OR 1.192, $p = 0.003$ respectively).

Conclusion: Leukocyte, neutrophil, lymphocyte counts, and NLR are important for monitoring the course of COVID-19, while leukocyte count and NLR on day seven of hospitalization can be considered predictors of disease severity, with cut-off values of $12,05 \times 10^9/L$ and 9.5, respectively.

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Relationship Between Acute Pancreatitis and SARS-CoV-2 Virus

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Background: Several studies have described the involvement of tissues other than the respiratory tract, such as the gastrointestinal tract, during the SARS-CoV-2 pandemic. The enzyme-2, which converts angiotensin, a functional receptor of the host cell of the virus that is expressed in organs and tissues, seems to play an important role in the pathophysiology and presentation of this disease. This receptor is located in the exocrine glands and islets in the pancreas, which makes it a possible target for the virus and subsequent damage to the pancreas.

Case presentation: Due to the development of SARS COV-2 infection and poor overall state, a 72-year-old patient previously hospitalized at the Krusevac General Hospital for acute pancreatitis is transported to the Kovid Hospital Parunovac by ambulance accompanied by medical personnel. Therapy was established in accordance to the protocol for COVID 19 and in accordance with the previously diagnosis of acute pancreatitis. Laboratory and diagnostic procedures were performed regularly. The patient responded well to rehydration and triple antibiotic therapy in the laboratory. Nevertheless, three days after hospitalization, a lethal outcome occurred.

Conclusion: The mortality was most likely caused by acute pancreatitis, which resulted in numerous cytopathological abnormalities, and the later presence of SARS COV-2 virus accelerated metabolic processes. Despite the rapid and expert actions of the specialists at Kovid Hospital Parunovac, the patient died.

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COVID-19 in Population over 60 Years - Single Department Experience

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Background: COVID-19 in the elderly usually has a more severe clinical form, but risk factors for adverse course are still being investigated. The aim of the study was to analyze COVID-19 in people over 60ys of age.

Methods: Patients with proven SARS-COV-2 infection treated in the Department of Hepatology, Clinic for Infectious and tropical Diseases, UCCS were analyzed retrospectively in the period from December 1st 2021 to March 1st 2022. Methods of descriptive and analytical statistics were used and risk factors for death were analyzed.

Results: In the analyzed period 78 patients were treated, with an average age of 75.1±8.3ys, by categories: 60-69ys 26.9%, 70-79ys 43.6%, >80ys 29.5%. Totally 85.8% of patients had one or more comorbidities, and cardiological were dominant (83.3%); 11.5% were immobile; 46.2% were completely vaccinated, 11.5% incompletely, and 42.3% were unvaccinated; 7.7% were without pneumonia, 92.3% had pneumonia (16.7% mild, 53.8% moderately severe, 21.8% severe. Antiviral therapy received 23.1%, 84.6% corticosteroids, 9% monoclonal antibodies, 29.5% biological therapy, while all received antibiotics. Death was recorded in 12.8%, and the rest fully recovered. Most deaths were in category >80ys (26.1%), with statistical significance ($p<0.001$). Significant risk factors for death also were: renal disease ($p=0.042$), dementia ($p=0.025$), immobility ($p=0.013$), non-vaccination ($p=0.031$), hypoalbuminemia ($p=0.006$), elevated LDH ($p=0.005$), severity of pneumonia- lethality in severe pneumonia was 47.1% ($p<0.001$) and bacterial superinfections ($p=0.009$).

Conclusion: COVID-19 has the most severe form and ends in death in category older than 80ys, in immobile and renal diseases, in unvaccinated patients, which is in accordance with the available knowledge.

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Effect of Remdesivir vs Standard Care on Clinical Status in Patients with Severe COVID-19

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Introduction. Remdesivir is an RNA polymerase inhibitor with potent antiviral activity recently approved for the treatment of hospitalized patients with COVID-19.

The aim was to determine the efficacy of Remdesivir treatment in comparison to standard care.

Methods. In a prospective single center study, we enrolled 78 patients (age 65.22±15.53, 50 males) from October 2021 through March 2022 with confirmed severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection and major clinical and radiologic evidence of pneumonia.

All patients were treated with usual protocol for COVID-19 and divided into two groups, R (Remdesivir) group (n = 39) and C (Control group) (n = 39) matched by age, gender, clinical and vaccination status. Remdesivir group additionally received a 5-day course of Remdesivir dosed intravenously at 200 mg on day 1 followed by 100 mg once daily on subsequent days. All lab parameters were analysed on the 6th day of treatment.

Results. In R group, X-ray improvement on the 6th day was better (58.9% vs. 30.8%, p=0.012), less patients were transferred to the intensive care unit (15.4% vs. 38.5%, p<0.022), the rate of survival was better (82.1% vs. 58.9%, p=0.025), D-dimer showed relative decrease (p=0.018), leukocytes absolute (p= <0.034) and relative decrease (p<0.043) than in control group. There were no statistically significant differences between groups in laboratory parameters (CRP, ferritin), as well as in the length of total hospitalization (p = 0.346).

Conclusion. Patients who received a 5-day course of Remdesivir had faster recovery and had a better survival rate in comparison to patients treated with the usual protocol for COVID-19.

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A Case of Papular-Purpuric Gloves and Socks Syndrome in a Patient with COVID-19

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Background: Although plethora of covid-19 associated skin manifestations have been reported since the beginning of the pandemic, papular-purpuric gloves and socks syndrome (PPGASS) has only recently been associated to SARS-CoV-2 infection.

Methods: A case report.

Results: We present a case of 43-year-old man presenting with purpuric lesions on the hands and feet whose SARS-CoV-2 Real-Time PCR test was positive, had fever up to 38 C, dry cough with high c-reactive protein (CRP) (293.5 mg/l), leukocytosis ($17 \times 10^9/L$) and granulocytosis (91.2%) as well as radiography findings of interstitial pneumonia. Reportedly, he developed demarcated purpuric lesions located on hands and feet several days after the onset of symptoms. He was treated as an outpatient at the Dermatovenerology Clinic. Analysis for parvoB19, HIV, hepatitis B and C virus were negative. The patient was treated with ceftriaxone, systemic antihistamines (levocetirizine), systemic corticosteroids (methylprednisolone) as well as topical corticosteroids subsequently leading to improvement in the purpuric eruption, chest radiography regression and normalization of CRP value. He required no oxygen support and remained afebrile throughout his treatment.

Conclusions: Although PPGASS has most commonly been associated with parvoB19 virus infections, there are reports on different viruses causing the same clinical condition. Regarding the spectrum of covid induced skin changes, forms of localized lesion are more commonly associated with milder forms (patients that are not oxygen dependent). Case of the presented patient may also strengthen the already hypothesized association of milder covid symptomatology and paraviral skin manifestations such as PPGASS.

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Acute Right Heart Decompensation Mimicking COVID-19 Pneumonia – Differential Diagnosis Challenge

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Background: COVID-19 may lead to severe thromboembolic events eliciting specific cardiovascular complications which may occur rapid and fatal. About 45% of patients with pulmonary thromboembolism (PTE) will have an acute right heart decompensation (ARD) with reports suggesting this percentage is higher in COVID-19 patients with severe disease forms, making the differential diagnosis more complicated.

Case Report: We report a case of 57-year old man with acute PTE in the setting of COVID-19 infection based on which he developed ARD. On the day when he was tested positive for COVID19, he was admitted to the Covid hospital 'Batajnica' with signs of dry cough, dyspnea, chest pain and weakness.

BP was 120/85mmHg, HR 130/min and oxygen saturation 98%. Electrocardiogram revealed new onset atrial fibrillation and chest X-ray was consistent with bilateral pleural effusions and increased cardiothoracic ratio. Briefly in the disease course he exhibited signs of severe ARD with laboratory findings of elevated: B-type natriuretic peptide (2599 ng/L), D-dimer (10.80 mg/L), hs-Troponin T (30 ng/ml) and C-reactive protein (54.7mg/L). Emergency CT pulmoangiography was performed and sub-segmental PTE verified. Consequently, echocardiography demonstrated overt congestive heart failure with ARD predominance. In addition to antibiotics and full anticoagulation patient was put on intensified diuretic therapy which proved successful.

Conclusions: COVID-19 associated PTE in our patient yielded ARD which may mimic COVID-19 pneumonia due to many similarities between them. Hallmark of this entity is the rapidly progressive heart failure which can be mistaken to viral pneumonia. High index of clinical suspicion is warranted in these settings.

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Acute Limb Ischemia in Hospitalised COVID-19 Positive Patients

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Background: In COVID-19 disease, in addition to pulmonary, existence of various extrapulmonary complications has been recognized, of which thromboembolic are common due to hypercoagulability state. The aim of this study was to describe the clinical characteristics of hospitalized COVID-positive patients who were treated surgically for acute limb ischemia (ALI).

Methods: Single center, observational and retrospective study was performed. The variables which were considered were gender, age, associated comorbidities, severity of pneumonia shown by ventilation modality, severity of acute ischemia, localisation of thromboembolic process and modality of surgical treatment.

Results: Total of 22 COVID-positive patients with ALI were evaluated from March 2021 to January 2022, mean age being 69.09 ± 11.93 years. Most common comorbidities were hypertension (81.82%), diabetes mellitus (31.82%) and atrial fibrillation (18.18%). Acute ischemia was graded based on Rutherford classification - gradus IIa included 36.36%, gradus IIb 50% and gradus III 13.63% of patients. Localisation of thrombotic process was iliaco-femoral in 50%, popliteo-crural in 18.18% and brachial in 31.82%. Thrombectomy was performed in 68.18% and bypass procedure in 9.09%. Primary amputation was performed in 22.73% and 18.18% of patients underwent secondary amputation. Overall intrahospital mortality rate was 77.27% and those patients who were on higher modalities of oxygenotherapy (NIV, MV) had a statistically significant higher mortality rate ($p = 0.0172$).

Conclusion: ALI in the setting of COVID-19 disease is a severe limb-threatening and unfavourable state. Considering high mortality in patients with higher levels of ventilation modality, larger studies should be made to assess the usefulness of operative versus anticoagulant treatment alone in these patients.

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Spontaneous Intracranial Hemorrhage in Hospitalized Patients with COVID- 19: A Case Series

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Background: The coronavirus disease 2019 (COVID-19) is an ongoing worldwide health emergency. Even though the most common symptoms are known to be related with the pulmonary and cardiovascular systems, COVID-19 can also result in damage to the central nervous system. There has been a high rate of intracranial hemorrhage (ICH) associated with COVID-19.

Methods: The retrospective study included collected and analyzed retrospective intracranial hemorrhage case series of patients who have had confirmed COVID-19 and who were hospitalized in COVID hospital Batajnica in the period between December 2020 and January 2022.

Results: We identified a total of 37 cases of concurrent non-traumatic intracerebral hemorrhage clinically and radiologically using non-contrast CT. All patients were diagnosed and confirmed with COVID-19. Majority of the COVID-19 patients with intracranial hemorrhage were male 19 (51.35%). The reported age of this patients ranged from 32 to 92 years. Hemorrhage involving multiple and massive cranial compartments was reported in 43% of cases. Most of these patients were on some form of anticoagulation therapy.

Conclusions: Early identification of patients at risk of developing ICH, especially with comorbid conditions, may be important to improve outcomes. COVID-19 associated ICH is often associated with at least one known ICH risk factor and severe pneumonia. Patients with intracranial hemorrhage during a COVID-19 infection are more likely to have a longer length of stay, to require ICU level care, to require mechanical ventilation and have higher mortality.

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Severity of Acute Limb Ischemia and Adverse Outcomes in a Hospitalized Patients with COVID-19: A Case Report

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Background: The COVID-19 coronavirus disease has its increasing complications on cardiovascular system, especially in patients presenting with Acute Limb Ischemia, which can be diagnosed by undergoing Computed Tomography Angiography(CTA) examination. Acute Limb Ischemia is a vascular emergency and it is not so often described and could be underestimated. Hypercoagulability status is one of the causes of complication from severe COVID-19 with a high risk of acute arterial thrombosis. The aim of this study was to present the most usual cases of acute unilateral and bilateral limb ischemia as a thromboembolic complication in a patients with COVID-19 and its outcome.

Methods: We retrospectively included all patients who were consecutively referred for CTA examination by vascular surgeons in the period from March 2021 to February 2022 in COVID hospital Batajnica.

Results: A total of 45 patients were referred to CT diagnostic unit during this period under suspicion of diagnosis of Acute Limb Ischemia by vascular surgeons. At 22 patients diagnosis was confirmed on CTA examination. Majority were male 15 (68.8%) with a high rate of operations or amputation. We reported the cases of two male patients diagnosed with Acute Limb Ischemia. Death or limb amputation was more common than survival in COVID-19 patients

Conclusions: It is important to raise awareness of acute limb ischemia and arterial thrombosis as a more frequent complication caused by COVID-19. Adequate and prompt recognition by clinicians is essential for early treatment and has a great impact on clinical outcome.

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Specifics of Acute Pancreatitis in Patients with COVID-19 Infection - A Case Report

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Introduction: COVID-19 infection primarily affects the respiratory system, but also affects the gastrointestinal system. Approximately 25% of patients have digestive symptoms, while about 39% have an increase in liver enzymes. However, we still don't have conclusive results from the studies of acute pancreatitis (AP) in COVID19 infection.

Case Presentation: We present a 73-year-old male patient who is experiencing epigastric pain and fever. His past medical history includes hypertension, chronic renal disease and ischemic heart disease with an implanted stent. After the verification of COVID-19 infection, he was admitted to our institution. Lungs X-rays showed bilateral pneumonia of viral etiology. After two weeks of hospital treatment, an increase in the inflammation marker is registered, with a fivefold increase in pancreatic enzymes. A CT examination of the abdomen and small pelvis was performed, which verified necrotizing AP with the formation of WON (walled-off pancreatic necrosis). Based on all diagnostic methods, the diagnosis of necrotizing AP with WON was made. Other etiological factors were previously excluded. Surgical treatment isn't indicated. Substitution-suppressive measures were applied, with the treatment of COVID19 infection according to the protocol. The patient recovered and was released for home treatment. Overall data suggest the suspicion, that COVID19 infection isn't only the cause of AP but also determines its stages, since the severity of both diseases correlated.

Conclusion: The data suggests that COVID-19 may worsen the severity of pancreatitis and be a contributing factor. We advise the assessment of possible AP, in patients with abdominal pain and active COVID-19.

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Pancreatic Pseudoaneurysm Rupture in Patient With COVID-19 Pneumonia and Recurrent Episode of Acute Pancreatitis

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Introduction: Here we report a rare case of pancreatic pseudoaneurysm rupture in a patient with Covid 19 pneumonia and recurrent episodes of acute pancreatitis. Pancreatic pseudoaneurysm is an unusual clinical entity, caused by erosion of a pancreatic or peripancreatic artery due to pancreatic enzymes. It is most common after pancreatitis, but it can also occur after pancreaticobiliary surgery, trauma and traffic accidents.

Case report: A 33-year-old male with resistant hypertension, chronic renal failure grade V, history of alcohol abuse and a previous attack of acute pancreatitis, was admitted to our institution after confirmed Covid 19 pneumonia. He was treated according to the protocol for Covid 19 pneumonia (corticosteroids, antibiotics, anticoagulant therapy). He came to the Diagnostic Center with severe acute abdominal pain and elevated pancreatic enzymes. Both sonograph and contrast-enhanced CT scan showed necrotic collections in pancreatic tissue and pseudoaneurysm of one of the pancreaticoduodenal arcade arteries in pancreatic head with a maximum diameter of 53 mm. After 7 days, laboratory examination revealed elevated white blood cell count, as well as elevated serum lipase, decreased hemoglobin, and red blood cell. The control CT scan showed progression of necrotic fluid collections with signs of intralesional hemorrhage, primarily of pseudoaneurysm origin.

Conclusion: Pancreatic pseudoaneurysm is a rare vascular complication of pancreatitis. These aneurysms are often accompanied by life-threatening complications, mainly rupture and bleeding. In Covid 19 patients, endothelial injuries, microangiopathy, and endothelialitis directly caused by SARS-CoV-2 have been reported. Given the effect of SARS-CoV-2 on blood vessels, timely diagnosis and urgent treatment of pseudoaneurysm are necessary.

Key words: pseudoaneurysm, pancreatitis, Covid 19 pneumonia

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Acute Leukemia and SARS-CoV-2 Infection: Single Centre Experience

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Background: Reliable data regarding treatment of patients with acute leukemia (AL) during COVID-19 pandemic are scarce.

Aims: To determine clinical characteristics of COVID-19 and to assess risk factors for mortality in patients with AL.

Methods: Prospective cohort study included 51 adult AL patients with COVID-19. Base-line data: age, sex, comorbidities, AL type, treatment, time since diagnosis and outcome, laboratory parameters at the onset of infection were collected. Data regarding COVID-19 symptoms, disease severity, therapy and time to PCR negativity were collected.

Results: Most patients (80.4%) had acute myeloid leukemia. At time of COVID-19 diagnosis 35.3% of patients were newly diagnosed with AL and 29.4% had bone marrow aplasia. Asymptomatic, mild to moderate, severe and critical COVID-19 was registered in 9.8%, 43.1%, 37.3% and 9.8% patients, respectively. Median time to PCR negativity was 18 days (range 10-50). Patients newly diagnosed with AL (OR 6.00 (95%CI 1.133–15.188) and patients with bone marrow aplasia (OR 4.148 (95%CI 1.133–15.188) had a significantly worse outcome in comparison with patients in CR. Pneumonia severity (OR 14.963 (95%CI 3.212–69.700) and need for oxygen therapy (OR 6.455 (95%CI 2.56–20.262) were associated with higher mortality risk. Lower platelets (OR 0.985 (95%CI 0.973–0.996)), prolonged PT (OR 1.554 (95%CI 1.104–2.186)), higher ISTH DIC score (OR 2.122 (95%CI 1.258–3.576)), CRP (OR 1.011 (95%CI 1.004–1018) and LDH (OR 1.001 (95%CI 1.000–1.003) were predictive for death.

Conclusions: Since the mortality (33.3%) and intrahospital transmission (50.98%) rates are high, rigorous isolation of AL patients, symptoms monitoring and prompt testing should be prioritized.

Keywords: Acute lymphoblastic leukemia, Acute myeloid leukemia, Acute promyelocytic leukemia, COVID-19

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Clinical Characteristics of Pulmonary Embolism in Post-COVID-19 patients

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Introduction: COVID-19 was associated with thromboembolic events, including pulmonary embolism (PE), with clinical, laboratory, and radiological characteristics of the embolism. There are no data about the difference in PE patients with and without previous COVID-19.

Aim: To analyze the possible differences between patients recovering from COVID-19 and those without previous SARS-CoV-2 infection, considering the clinical, laboratory and radiological characteristics of pulmonary embolism.

Material and methods: Analyzed patients with PE were hospitalized in the period from June 1, 2020 to November 30, 2021. Patients were divided into two groups: study group A was consisted of subjects with PE and previous COVID-19, and control group B, which included PE patients without previous COVID-19 infection. Demographic characteristics, the presence of risk factors for PE, comorbidity, laboratory, clinical and radiological characteristics of PE were determined.

Results: The analysis was performed on 119 patients, average age 63.8 ± 17.7 years (mean=67), 65 female (54.6%). There was no significant difference in the age and sex between group A and B ($p > 0.05$). There were 27 (22.7%) smokers with significantly higher number in group A ($p < 0.01$). Risk factors were recognized in 88 (73.9%) patients and significantly less frequent in group A ($p < 0.05$). Malignancy was reported in 18 (15.1%) patient with higher frequency in group B ($p < 0.05$). There was no difference between these groups in comorbid diseases (arterial hypertension, chronic respiratory disorders, diabetes mellitus). Deep venous thrombosis was diagnosed in 33 patients (27.7%) with no significant difference between groups. According to MDCT pulmonary angiography the results, embolism was localized in main pulmonary artery branch in 30 (25.4%) patients (A: 10 pts, group B: 23 pts, $p < 0.05$). On admission, CRP level was 94.4 ± 10.8 mg/L with no significant difference between the subjects and the control group ($p > 0.05$). Maximal CRP level during hospitalization was 74.9 ± 107.8 with no significant difference between the subjects and the control group ($p > 0.05$). On admission, D-dimer level was 5.996 ± 7.09 ng/ml. There was a statistically

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significant difference in the values of D-dimer on hospital admission between these groups (A: 4.158 ± 3.24 ; B: 6.963 ± 8.28 ; $p < 0.001$), as well as in the values the largest measured D-dimer (A: 4.634 ± 4.369 ; B: 4.715 ± 9.359 ; $p < 0.05$). No statistically significant difference was found in the values of BNP and troponin between the examined and control groups ($p > 0.05$).

Conclusion: Patients with PE treated with COVID-19 had special characteristics of PE, more often women, less likely to have a risk factor for PE, deep venous thrombosis less frequently, the main pulmonary artery was less frequently affected, D-dimer was lower in PE patients who are recovering from COVID-19.

Keywords: Pulmonary embolism, COVID-19, post-COVID

Autoimmune Virus and Autoimmune Disease: A Case of Covid-19 in Patient with Granulomatosis with Polyangiitis- Diagnostic and Therapeutic Challenge

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Background: Corona-19 virus disease (Covid-19) and granulomatosis with polyangiitis (GPA) are multi-systemic diseases with overlapping clinical, laboratory, and radiographic features resulting in consequent differential diagnostic challenges. It is not completely clear whether patients on immunosuppressive therapy are at higher risk for severe and fatal Covid-19. **Methods:** A case report of a patient with severe GPA treated with immunosuppressive therapy and rituximab with consequent fatal outcome due to progression of pulmonary manifestations and sepsis after prolonged evolution of Covid-19.

Case report: A 58-year-old man with a 13-year medical history of GPA was treated with anti-CD20 (rituximab) in three cycles, last one in July 2021 in addition to corticosteroid and immunosuppressive therapy. He presented with high fever and cough from the end of October 2021 but tested negative for SARS CoV2 antigen so he was treated with antibiotics. Two weeks later he was admitted to Covid Hospital "Batajnica" because he was still febrile and retested PCR positive for SARS CoV2. Oxygenotherapy started 21st day from the onset of symptoms while 39th day there was a sudden deterioration of respiratory function with bilateral pneumothorax and hemodynamic instability. Clinical and laboratory findings were consistent with the development of sepsis with consequent fatal outcome.

Conclusion: Patients with vasculitis may be at increased risk for SARS CoV-2 infection, complications and fatalities, as well as atypical, prolonged and recurrent diseases. Differentiation of superimposed SARS CoV-2 infection from pre-existing autoimmune lung disease can be challenging and requires careful correlation of previous and current radiographic findings with clinical and laboratory parameters. There is a higher risk of Covid-19 complications in patients treated with rituximab due to the absence of a humoral protective immune response and increased risk of developing secondary bacterial infections and sepsis.

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Previously Undiscovered WPW Syndrome in Patient Treated for COVID-19

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Background: WPW syndrome, the most common pre-excitation syndrome, usually diagnosed in young adults, is caused by the existence of an accessory pathway. Most tachycardias seen in WPW syndrome are supra-ventricular, however in about 5% of cases, retrograde conduction through AV node can lead to life-threatening arrhythmias.

We report a case of a 65-year old male with history of T cell lymphoma in remission, hypertension and depression, transferred to our hospital due to worsening of COVID-19 pneumonia that required high-flow oxygen support. Admission ECG showed sinus rhythm with WPW pattern, short PR interval and delta wave, patient had no prior history of symptoms that could be interpreted as WPW syndrome. On third day, patient's condition worsened requiring non invasive ventilation.

Several hours after NIV was started, even with improved gas exchange, patient developed an AF with rapid ventricular response followed by episodes of nsVT subsequently treated with intravenous amiodarone, after which he returned to sinus rhythm. After switching to oral amiodarone the same pattern of arrhythmia, AF followed by nsVT, occurred and was terminated by iv amiodarone.

Patient's clinical condition worsened, even though he was in sinus rhythm, which required transfer to the ICU and eventually intubation with mechanical ventilation. He developed ventilator-associated pneumonia and sepsis resulting in fatal outcome.

Conclusion: Different extra-pulmonary manifestations of COVID-19, including arrhythmias, have been described. We report a case of previously undiagnosed WPW syndrome that resulted in AF with episodes of nsVT. If these arrhythmias were caused by direct impact of coronavirus on conduction system remains unanswered.

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COVID-19 in Patients with Chronic Immune Thrombocytopenia on Thrombopoietin Receptor Agonists: Single Center Experience

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Introduction: There are limited data on the impact of severe acute respiratory syndrome corona virus 2 infection in patients previously diagnosed with primary immune thrombocytopenia (ITP) on thrombopoietin receptor agonist therapy (TPO-RA).

Aim: To determine COVID-19 impact on platelet count (PC) dynamics in patients with chronic ITP on TPO-RA.

Methods: Eleven chronic ITP patients who had contracted COVID-19 and had been treated with TPO-RA are included in the study. Demographic, ITP treatment and comorbidities data were collected retrospectively from patients' medical records. Data regarding clinical course of COVID-19 were collected prospectively.

Results: During the infection all patients had platelet count (PC) higher than average, and PC peak was mainly observed on day 7. For that reason, therapy modification was required. However, PC increment was transient in most ITP patients. One patient developed pulmonary embolism despite the use of therapeutic dose of anticoagulants. One patient died of respiratory failure, while another developed rebound thrombocytopenia after the infection and consequential intracerebral hemorrhage.

Conclusion: Careful platelet count monitoring and therapy management are needed in chronic ITP patients on TPO-RAs with COVID-19.

Keywords: SARS-CoV-2, COVID-19, ITP, eltrombopag, romiplostim, thrombocytosis

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Positive Outcome of COVID-19 and Mycobacterium Tuberculosis Coinfection in Patient with Sjögren's Syndrome: A Case Report

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Introduction: COVID-19 and tuberculosis (TB) are both infectious diseases, caused by pathogens that infect mainly the respiratory system, but they can cause disease in almost every part of the body. Sjögren's syndrome (SjS) is a systemic autoimmune disease characterized by chronic inflammation of the exocrine glands (mainly lacrimal and salivary glands). The aim is to present a patient with SjS on immunosuppressive therapy who has developed TB and COVID-19 coinfection.

Case Presentation: A 70-year-old patient was transferred from the Clinic of Pulmonology to the Covid Hospital Batajnica due to a positive PCR test for SARS-CoV-2. The patient has been treated for SjS since 2019. In September 2021, direct microscopy of sputum was positive for *M. tuberculosis*, and treatment with antituberculosis drugs (HRZE) was started. The patient was on immunosuppressive therapy, which resulted in the appearance of TB as well as COVID-19 co-infection. Complaints in the form of weakness and fever occurred 3 days before the admission. HRZE therapy resulted in abnormal hepatogram, and the patient's therapy was temporarily discontinued. The patient was treated according to the National Protocol for the treatment of COVID 19 infection. After 25 days the patient fully recovered, HRZE therapy was re-introduced. She was then transferred to the Clinic of Pulmonology to continue treatment for TB.

Conclusions: We have presented a rare case of a successfully treated patient with COVID-19 and TB coinfection, who was immunosuppressed by drugs due to Sjögren's syndrome. Patients on immunosuppressive therapy have an increased risk of TB and COVID-19.

Keywords: COVID-19, *M. tuberculosis*, Co-infection, Sjögren's syndrome, Immunosuppressive therapy

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Significance of Early Rehabilitation - Recovery of Critically Ill COVID-19 Patient

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The coronavirus disease 2019 (COVID-19) pandemic has presented unique challenges for physical therapy practitioners working in acute and critical care settings. Survivors of critical illness have shown to have severe physical functional disability due to deconditioning and muscle wasting. After recovering from acute respiratory distress syndrome, exercise limitation, physical sequelae, and decreased quality of life may persist for several years.

We present a case of a 41-year-old man who was diagnosed with COVID-19 requiring endotracheal intubation and mechanical ventilation. He developed several complications, including spontaneous pneumothorax and septicemia. The patient was extubated after 20 days, and he was found to have severe weakness of the upper and lower extremities. The neurologic examination revealed severe flaccid quadriparesis, with depressed and symmetric deep tendon reflexes. Spinal fluid studies were done (CFS protein level was 0.71; CFS glucose level was 4.2; without nucleated cell). Superficial sensibility was preserved.

Pulmonary rehabilitation started in the intensive care unit (ICU) and was composed of physical modalities intended to remove retained airway secretions and exercise therapies to improve respiratory function. Physical rehabilitation, including early mobilization, positioning, and limb exercises, were performed. After three weeks of intensive rehabilitation, measurements on manual muscle testing (MMT) were 3/5 on upper extremities and 2/5 on lower extremities. His activities of daily living improved to where he could eat without help and maintain a good balance while sitting on the edge of the bed.

Early and appropriate rehabilitation intervention improved the quality of our patient's life and functional capacity.

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Bullous Lung Disease Following COVID- 19 Pneumonia: Case Report

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Background: Chronic obstructive pulmonary disease (COPD) occurs in older individuals due to persistent inhalation of noxious particles, commonly from cigarette smoking. COPD patient may be more susceptible to acquiring viral infections including SARS- CoV-2.

Case presentation: A 65- old man with chronic obstructive pulmonary disease and first episode of acute heart failure was hospitalized after confirmation of a positive COVID- 19 antigen test. Patient reports shortness of breath, fatigue and suffocation. Chest CT scan showed extensive bullous lung disease following diffuse ground-glass opacities. Repeated CT scan after six days showed consolidation peripheral lung part and infected lung bulla in the right middle lobe. White blood-cell and inflammatory biochemical markers had been elevated: WBC $12.3 \cdot 10^9/L$, NE% 85.94%, NE# $10.56 \cdot 10^9/L$, CRP 96.5 mg/L, ferritin 2149.1 ug/L. Five days after diagnosis patient passed away due to cardiorespiratory insufficiency.

Conclusion: COVID- 19 pneumonia following bullous lung disease may lead to severe form due to complications and prolonged treatment.

Key words: chronic obstructive pulmonary disease, bullous lung disease, emphysema, COVID- 19 pneumonia

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Treatment Challenges in a Patient with a Mechanical Valve and Development of Active Muscle Bleeding in Onset COVID-19

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Background: COVID-19 has been the cause of a global pandemic whose clinical manifestations extend far beyond respiratory disease, with its reported pro-coagulant effect despite anticoagulation therapy, often requiring prolonged hospitalization. On the other spectrum, complications in the form of muscle hematomas have emerged in COVID-19 patients due to prescribed anticoagulation therapy.

Case summary: We report a case of a 81-year old female patient with COVID-19 pneumonia and bilateral pleural effusion with implanted cardiac pacemaker and mechanical mitral valve on oral anticoagulation therapy in her medical history. During hospitalization, she developed non-STEMI myocardial infarction and to her oral anticoagulant therapy, antithrombotic therapy was added. However, after developing abdominal pain, she was diagnosed with active hemorrhage in right m. iliopsoas and right m. rectus abdominis.

This case highlights the requirement of full hands on treatment approach from a team of medical experts, including cardiologist, pulmonologist, surgeons, radiologist, internal medicine and anesthesia specialist, walking on a thin line between high-risk mitral valve thrombosis and active bleeding, whilst constantly fighting bilateral COVID-19 pneumonia. Multidisciplinary approach had a positive outcome, as after 14 days, the patient was discharged with regressed muscle hematoma and carefully outlined oral anticoagulant therapy.

Conclusion: Since COVID-19 pandemic started, it has proven to be systemic disease surpassing pulmonary manifestations. It more than often requires coordinated work of multiple medical branches in order to ensure prosperous treatment.

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Severe COVID-19 Pneumonia in ALK Positive Lung Adenocarcinoma Patient on Specific Biologic Therapy – Case Report

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Introduction: COVID19 global pandemic has caused high worldwide mortality rates. Patients with lung adenocarcinoma are more sensitive to COVID19 infection and usually develop severe pneumonia. We are presenting the case of ALK (anaplastic lymphoma kinase) positive lung adenocarcinoma patient receiving specific biologic therapy with severe COVID-19 pneumonia.

Case Presentation: Female patient 52 years old was admitted to our hospital due to severe COVID19 pneumonia. Previously she was treated for lung adenocarcinoma with brain metastasis and regional node involvement. Cancer ALK expression was verified and specific therapy with alectinib (second generation ALK inhibitor) was underway. Symptoms of weakness, cough and fever appeared just a few days after the last therapy cycle. Approximately 15 days after the symptoms occurred she was clinically deteriorating with massive bilateral pneumonia verified on radiological examination and COVID19 was diagnosed. After admission to our hospital, on the third day, her condition was complicated with acute respiratory failure. Abnormal radiological findings coupled with worsening arterial blood gases prompted us to initiate NIMV (non-invasive mechanical ventilation) support. The patient was treated according to our National protocol for COVID19 management. Antiviral therapy wasn't used. Month after the hospitalization the patient recovered and was transferred to another hospital for further cancer treatment.

Conclusion: We report successful treatment of COVID19 in female patient with disseminated ALK positive lung adenocarcinoma. Beneficial effects of ALK inhibitors could have favourable effects on disease outcome. Further investigations are needed in exploring all the possible applications of ALK inhibitor therapy in clinical settings.

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Effect of Early Intubation in Severely Ill Patients with Pneumonia Due to COVID-19

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Background: Critically ill patients with COVID-19 pneumonia require non-invasive or invasive ventilation. While these patients have a high mortality rate, physicians around the world are fighting to save patients' lives. We have focused to find the best approach for the time of intubation, which might reduce mortality, complications, and time spent in critical care units.

Methods: We conducted a retrospective cohort study in three COVID-19 intensive care units in Covid hospital Batajnica, Serbia. The study included adult patients with laboratory-confirmed COVID-19 pneumonia in a period dating from 15.8.2021 to 15.10.2021, who were intubated in the intensive care unit. Patients who had been intubated before admission were not included. During this time, the Delta strain of the SARS-CoV-2 virus was the most prevalent in Serbia.

Results: Patients who have been intubated early in the illness progression have a greater survival rate. Among 92 patients who were intubated in the intensive care unit, 48 (52.2%) were male. Seventy-three individuals (79.3%) had comorbidities. Thirty-six (39.1%) patients were intubated on the first day of admission. The remaining underwent non-invasive ventilation (NIV). Patients who have been intubated early in the illness progression have a greater survival rate. Eight patients (8.7%) who were intubated due to an NIV failure after six days had no survivors. The overall survival rate was 3.3 percent in patients with NIV failure.

Conclusion: With the emergence of the new SARS-CoV-2 strains, the clinical presentation in patients is changing and there is still much controversy regarding the best ventilation strategy in patients with acute respiratory failure. Prolonged non-invasive ventilation can cause damage to the diaphragm through high inspiratory efforts. Intubation is a stressful procedure, followed by sedation which may result in hemodynamic instability, and other issues that may worsen the outcome. The benefits and limitations of the two approaches should be carefully examined for each patient.

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Clinical Characteristics and Outcomes of Critically Ill COVID-19 Elderly Patients During the Delta Strain Surge: A Single-Center Experience

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Background: Elderly patients admitted to the ICU have an increased risk for mortality. Our study aimed to explore the clinical characteristics of the patients older than 80 years with COVID-19 admitted to the intensive care unit (ICU), and to determine the risk factors for mortality.

Material and methods: We conducted a retrospective study of the elderly patients treated in the six ICUs in the Covid Hospital Batajnica from September 2020 to March 2021.

Results: During the study period a total of 293 patients were enrolled. The median age was 84 [81-86] years, with 128 (43.7%) male and 159 (54.3%) non-vaccinated patients. More than one comorbidity was recorded in 189 (64.5%) patients, and the mean SOFA score on admission to the ICU was 8 [6-10]. An acute respiratory failure was the reason for ICU admission in 230 (78.5%) patients, with the median PaO₂/FiO₂ of 60.0 [46.0-89.5] mmHg. Non-invasive or invasive mechanical ventilation was performed in 285 (97.3%) subjects. Fourteen (4.8%) patients survived. When compared to non-survivors, patients who survived were more frequently fully vaccinated (12.5% vs 2.5%, $p=0.013$), had higher PaO₂/FiO₂ on admission (115 [92-130] vs 59[46-72], $p<0.001$), lower SOFA score (5.5[4.5-6.0] vs 8.0[6.5-10.0], $p<0.001$), a shorter hospital stay before ICU admission (3[1-5] vs 12[8-15] days, $p<0.001$), and were less frequently in need for vasoactive drugs (5/248(2.0%) vs 9/45(20.2%), $p<0.001$). Kaplan-Meier estimate showed higher mortality in patients with hypernatremia on admission (log-rank $p<0.001$). Factors associated with mortality were SOFA Neuro (HR 1.12;95%CI 1.01-1.25), SOFA Kidney (1.21;1.10-1.34), and the intubation on the day of ICU admission (1.50;1.06-2.11).

Conclusion: Critically ill COVID-19 patients aged 80+ have very high mortality. Disease severity and frailty contribute to a bad prognosis. Stringent monitoring is needed upon hospital admission to preclude the need for ICU in this vulnerable group.

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Acute-on-Chronic Kidney Disease (CKD) as a Predictor of Poor Prognosis in Patients with COVID-19

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Background: Patients with chronic diseases are more susceptible to COVID-19 infection and are more likely to develop a severe form of the disease. This includes patients with CKD and patients on hemodialysis.

Methods and results: This descriptive study included 20 patients with CKD who were treated at the Covid-19 Hospital Batajnica UKCS in the period between November 2021 and February 2022. The age of the patients was 70 ± 12.5 years (range 42-94). There were 14 men aged 68 ± 14.21 and 6 women aged 73 ± 7.2 years. All patients previously had stable CKD, most often as a result of hypertension (50%) or type 2 diabetes. One patient had osteodystrophy of the kidney and one had polycystic kidney disease. They were treated according to the National protocol for the treatment of COVID-19. All 20 patients had a deterioration in renal function and hemodialysis was started via temporary central venous catheter (CVK). Complete recovery of renal function occurred in two patients (10%). Hemodialysis was continued after discharge in 5 of 20 patients (25%). 13 patients (65%) died, 10 of those developed massive bilateral pneumonia requiring NIV or intubation, while 3 died of sepsis without significant radiographic findings at lungs.

Conclusion: In the previous two years, a number of studies have shown that patients with CKD have a high mortality rate when infected with COVID-19. Among patients with CKD, patients on hemodialysis have a worse outcome, especially patients who have just started hemodialysis. Our study supports these results.

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Successful Treatment of Patient with COVID-19 Pneumonia, and Severe Cardiomyopathy - Case Report

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Introduction: During the pandemic of Covid 19 infection, the most common clinical presentation was accompanied pneumonia. Pneumonia and desaturation were indications for inpatient treatment. The typical appearance of COVID 19 pneumonia on chest CT images is bilateral peripheral opacities with a lower lung distribution. CT signs of ground glass opacity are not exclusively signs of Covid 19, so we need to be extra careful especially in complex clinical presentation. It has been proven that patients with cardiomyopathy, diabetes mellitus, hypertension, obesity, COPD have a worse outcome.

Methods: Pubmed search of literature, standard clinical biochemical and echocardiographic methods

Case report: Patient (D.K.) 68 years old admitted in hospital because of radiology confirmed bilateral Covid 19 pneumonia. In his medical history he has severe form of COPD treated with domestic oxygen therapy, combined inhalation therapy, Morbus Chron (previously treated with biological treatment, infliximab and methotrexate. He underwent resection of small intestine on 2011. He was treated by intravenous corticosteroids, antibiotic and oxygen and other supportive therapy. During hospitalization his condition suddenly worsened, he became orthopneic with clinical signs of pulmonary oedema. Echocardiography revealed severe cardiomyopathy with systolic ejection fraction 15 percent. He was additionally treated with intravenous and peroral diuretics, ACE inhibitor, nitrovasodilators, beta blockers, statins in later course and other supportive therapy.

After 20 days, the patient was successfully recovered and discharged for home treatment. **Conclusions:** With adequate and timely clinical diagnosis and optimal therapy, patients with Covid 19 associated pneumonia, severe cardiomyopathy and numerous comorbidities can be successfully treated.

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Influence of Work in the Covid System and Burnout Syndrome in Employees of the Clinic for Digestive Surgery

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Background: The COVID-19 pandemic had a huge impact on the overload of the health system putting healthcare workers under a great deal of psychological stress. Extraordinary involvement in covid systems, work overload, as well as extreme pressures caused by the COVID-19 pandemic have led to an escalation of burnout syndrome in healthcare workers. Aim of this study was to determine the prevalence of burnout syndrome among health workers of the Clinic for Digestive Surgery of the Clinical Center of Serbia during the COVID-19 pandemic.

Methods: Cross-sectional study was performed at the Clinic for Digestive Surgery. The sample consisted of 60 healthcare workers. Burnout syndrome was measured by the Maslach Burnout Inventory (MBI). In addition to the MBI, data were collected and analyzed on the total number of days spent in covid system, as well as the type of department in which the participant was engaged.

Results: Out of 60 healthcare workers, 43,33% were anesthesiologists and 56,67% were surgeons. 25% of participants spent six months to a year in the covid system. 45% of the total number of participants showed a high level of emotional exhaustion, with nearly the same percentages among surgeons and anesthesiologists. 16,67% showed a high level of depersonalization, and 15% showed a low level of personal accomplishment.

Conclusion: Burnout affects nearly half of the healthcare workers of the Clinic for Digestive Surgery during the COVID-19 pandemic. Appropriate strategies are needed to maintain mental health of healthcare personnel and to minimize burnout.

Keywords: burnout syndrome, healthcare workers, covid-19.

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Atypical Course of COVID-19 in Patient with Bruton Agammaglobulinemia

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Background: We present atypical course of the novel coronavirus disease (COVID-19) in 34-year man with Bruton agammaglobulinemia. The patient was successfully treated by a combination of available drugs, including convalescent plasma and interleukin-6 inhibitor.

He was diagnosed with bronchiectasis in the age of nine. Patient developed a low-grade fever. CT scan showed bilateral ground glass, predominance in the peripheral lower lobes, along with enlarged bronchial lymph nodes. After SARS CoV -2 was confirmed by RT -PCR from nasopharyngeal exudates, he was referred to the Clinic for Infectious and Tropical Diseases. At the admission, his temperature was 39°C, oxygen saturation of 97% on room air. Physical exam revealed discrete bilateral crackles on auscultation of the lungs. Initial laboratory analysis showed lymphopenia and elevated non-specific inflammation parameters. Immunoglobulin-G (IgG) was low, while immunoglobulin A and M (IgA and IgM) were below detection limit. Total number of lymphocytes rose to normal values after seven days. The patient received intravenous immunoglobulin, chloroquine phosphate, vancomycin, imipenem/cilastatin, levofloxacin, ascorbic acid, nadroparin. On day 3, he became hypoxic and complained of dyspnea, along with further increase in nonspecific inflammatory parameters and low IgG, in spite IgG substitution. Therefore, he received oxygen 3 l/min on nasal cannula, IVIG and two doses of tocilizumab. CT scan of the chest showed GGO and subpleural consolidation, along with bronchiectasis, pleural effusions and mediastinal lymphadenopathy. In next few days, there was improvement of non-specific inflammation parameters and oxygen saturation but fever persisted. On day 10, patient received COVID-19 convalescent plasma with methylprednisolone. During fourth week of treatment, CT scan revealed complete resolution of consolidation and pleural effusions, biochemical analyses were within normal ranges. Since SARS-CoV-2 PCR remained positive, he has to stay in hospital according to National guidelines. During the fifth week of hospitalization, patient developed second peak of fever and elevated non-specific

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inflammation parameters and CT scan confirmed pneumonia. New CT scan showed diffuse GGO with subpleural consolidation, bronchiectasis with fibrosis. Antimicrobial drugs were reintroduced. Anti SARS CoV-2 IgG antibodies were undetectable so he received COVID-19 convalescent plasma with methylprednisolone. He became SARS CoV-2 RT-PCR negative, five days after transfusion. Anti SARS CoV-2 IgG antibodies became undetectable seven days after transfusion. Fever persisted for next ten days. Finally, eight weeks after admission, patient remarkably recovered. Tocilizumab treatment was necessary in presented case, not only because IL-6 level was high, but also because of persistent fever and clinical deterioration of the patient. One of the most interesting aspects of the case was "second peak" of disease. Since the patient tested SARS CoV-2 positive for more than 5 weeks, the second peak of disease was considered to be a "relapse" of COVID-19.

Pulmonary Resection for Massive Lobar Hemorrhagic Infarction of the Lung During COVID-19

– A Case Report

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Background: Patients with COVID 19 viral pneumonia are predisposed to thrombotic complications, which can be explained by direct and indirect effects of COVID 19.

Methods: We reviewed medical history of a 62 years old male patient admitted to Clinic of Thoracic surgery, University Clinical Center of Serbia for surgical treatment after hospitalization for COVID 19 infection.

Results: Initially patient complained on unproductive cough, fever and tiredness and was tested positive on nasopharyngeal swab for SARS-Cov-2 virus. He was previously treated for hypertension, without other comorbidities and was unvaccinated against COVID-19. After initial home treatment with antibiotics, 13 days since beginning of symptoms he was admitted to COVID hospital due to progression – chest radiography revealed diffuse bilateral consolidations. He was treated with oxygen therapy, antibiotics and LMHW. Ten days into hospitalization he developed hemoptysis, chest radiography showed signs of air-fluid level in projection of lower left lobe. First CT showed cavity in left lower lobe besides opacification of lung parenchyma due to pneumonia. After successful treatment of pneumonia control CT after two weeks showed large consolidation with cavitation in inferior left lobe with air-fluid level and significant regression of opacification. Preoperative tests included lung function tests, bronchoscopy and cardiology exam. Eight weeks since patient tested positive, lower left lobectomy was performed. Histopathology finding showed massive infarction of the lung. During hospitalization patient was treated with antibiotics and LMWH, beside symptomatic therapy. Patient was discharged on postoperative day 7.

Conclusion: No complications developed in early postoperative period nor at three month follow-up.

Key words: hemorrhagic infarction, lung, COVID 19, lobectomy

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COVID-19 Presented with Deep Vein Thrombosis in a Patient with Paroxysmal Nocturnal Haemoglobinuria

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Background: Paroxysmal nocturnal haemoglobinuria (PNH) is a rare, acquired clonal haematological disease characterized by complement-mediated haemolysis, bone marrow failure and venous thrombosis. Anticomplement therapy eculizumab improves survival and reduces complications. COVID-19 is associated with high incidence of both venous and arterial thrombosis in hospitalized patients with pneumonia. Deep venous thrombosis (DVT) as the presenting symptom of COVID-19 is a rare event. We describe 33 years old, well-controlled PNH patient on eculizumab for more than 5 years who presented with DVT, while on warfarin, as the first sign of COVID-19.

Case description: PNH presented with haemolysis and thrombosis of superior sagittal sinus (2009) and splenic and mesenteric veins (2014), initially was treated with anticoagulants, while eculizumab was initiated in 2015 with warfarin, resulting in well controlled haemolysis, with no subsequent thrombotic events. In 2020 our patient presents with left popliteal DVT followed by subfebrility (37°C) 10 days after the last dose of eculizumab. Nadroparin in therapeutic dose was introduced. Laboratory tests showed decreased WBC 3.4x10⁹/L (neutrophils 1.4x10⁹/L, lymphocytes 1.4x10⁹/L) and Plt 140x10⁹/L; mild haemolytic anaemia (Hb 113 g/L, Rtc 265.5x10⁹/L, LDH 1020 U/L, absent haptoglobin). Elevated CRP 36.4 mg/L (N<10) and D-dimer 4.3 mg/L (N<0.5); normal fibrinogen, prolonged aPTT 43.7s (N 25.1–36.5), while INR was 2. COVID-19 nasopharyngeal RT-PCR showed positivity. The patient was afebrile and without respiratory symptoms throughout the period of thrombosis and follow-up (22 months). After 3 weeks, nadroparin was substituted with warfarin.

Conclusion: To our knowledge, this is the first described case of DVT in a PNH patient with COVID-19.

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Spontaneous Triple Muscle Hematoma in Elderly COVID-19 Patient on Anticoagulation Therapy – Case report and Literature overview

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Background: Infection-associated coagulopathy and subsequent venous and arterial thromboembolism during COVID19 are well recognized extrapulmonary manifestations that may progress to life-threatening conditions. To date, there is no international study that shows the optimal protocol of anticoagulant therapy (ACT) therefore ACT is based on the consensus of experts' opinions. Instead, hemorrhagic complications during COVID19 treatment are mostly related to the increased use of anticoagulation treatments in severe COVID19 patients, especially in the elderly.

Case Presentation: A 74-year-old female patient was admitted to our hospital with symptoms of COVID19. On the 17th intrahospital day, the patient complained of a sudden sharp left gluteal pain, and a significant drop in hemoglobin blood level was noticed. Bedside ultrasound revealed right rectus sheath and iliopsoas muscle hematomas. To confirm active bleeding, CT angiography was performed, which revealed signs of active bleeding in the rectus sheath and pectoral muscles. The patient was immediately admitted to the operation room, where all three hematomas were successfully evacuated. The postoperative course was successful in showing the rise of the hematological parameters.

Discussion: Spontaneous muscle hematomas (SMH) are defined by the occurrence of blood extravasation in a muscle group nonrelated to trauma. The most significant cause of the SMH is the ACT in the elderly, suggesting age-related organ and muscle changes attributed as risk factors. From our experience bedside, ultrasound was an initial diagnostic examination followed by CTA which provides essential information for treatment planning. Due to excessive use of ACT in COVID 19 treatment incidence of SMH is growing.

Conclusion: SRH is uncommon, potentially lethal, with a non-specific presentation that can lead to misdiagnosis. Nowadays every physician must be familiar with SMH, because of its high mortality.

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Reinfection of COVID-19 in a Patient in a Short Time Interval-Experience from Covid Hospital Batajnica, University Clinical Center Of Serbia

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Background: The general consensus among medical experts is that reinfection with Covid-19 may occur, but that severe forms of the disease are rare. Generally reinfection means that a person became infected and became ill and then recovered and then re-infected. One of the main questions is whether it is a matter of reinfection or reactivation of the virus and how it affects the severity of the disease.

Case: We present a 72-year-old patient, who is being treated for hypertension and atrial fibrillation, and is a candidate for stent implantation, vaccinated and immunocompetent who tested positive for the corona virus for the second time and who was hospitalized at the Batajnica Covid Hospital in february and march 2022. He had his first infection in October 2021. As a consequence of re-infection with Covid, the patient had a severe clinical picture of pneumonia, with a score on CT scan 23/25, with verified bronchiectasis and pulmonary emphysema, and who was treated with non-invasive ventilation.

Conclusions: It can be concluded that there is a tendency to reinfection in some patients that correlates with the severity of the disease.

Keywords: COVID-19, reinfection, severe pneumonia,

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Spectrum of Myocardial Lesions in COVID-19 Related Myocarditis

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Background. COVID-19 is associated with myocardial injury. The aim of this study is to evaluate the presence of myocardial injury in pts recently recovered from COVID-19 by using cardiac magnetic resonance imaging (CMR).

Methods. Out of 126 pts that participated in the study, which was conducted in the University Clinical Center of Serbia, 61 (48%) were male, mean age 45±15 years. All patients went through CMR examination using standard protocols.

Results. From the onset of the infection, mean time to CMR was 107 days, 61/126 (48%) pts had shown LGE. In 37/61 (61%) pts, LGE was identified in more than three segments and myocardial oedema was seen in 50/126 (40%) pts. There is no significant association between clinical symptoms and myocardial oedema by using T2FS. Pts with myocardial oedema had significantly decreased LVEDV in comparison to those without (133±30% vs 157±50%), decreased LVESV (51±11% vs 67±43%), and lower LVEF (51±10% vs 60±10%). Pts with more than 3 LGE affected segments had a lower LVEF than with less than 3 affected segments (58±12% vs 62±3). Pericardial LGE was seen in 55/126 (44%) pts, from which 33/55 (60%) had verified pneumonia. In pts with pericardial LGE, LVEF was lower in comparison with those without (61±9% vs 63±4% vs), and LVEDV (128±30% vs 138±39%, respectively) and ESV (48±13% vs 55±29%, respectively).

Conclusions. In a significant number of pts, COVID 19 causes myocardial injury that can be assessed by CMR. CMR plays a crucial role in the evaluation of these patients and risk identification.

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Headache in SARS-CoV-2 Patients with Cardioembolic Stroke

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Background: Neurologic manifestation of SARS-CoV-2 virus occurs in large amount of hospitalized patients. Headache are most common. Ischemic stroke is associated with covid patients in hospital, and cardioembolism is the most common cause of ischemic stroke. The aim of this study was to examine how the most common neurological symptom in most common ischemic stroke is associated with patients' clinical outcomes.

Methods: We studied 125 patients from 47 to 93 years of age with acute cardio-embolic stroke and laboratory confirmed COVID-19. There were 56 men, and 69 women patients from Saint Sava hospital with whom we examined headache and other clinical symptoms, as well as SARS-CoV-2 beta and delta variant. In the statistical analysis we use T and X2 tests.

Results: 26 of covid patients have a headache, whose mean age was $76,3 \pm 9,1$. The age was not statistically significantly connected with headache in covid patients. 42,3% of men, and 45,5% of women had headache. Patients with headache more commonly have beta variant of SARS-CoV 2 virus (96,2% vs 3,8%, $p=0,0006$) and also have fatigue together with headache ($p=0,009$). There is no significant difference in outcome in patient with headache and those without it.

Conclusions: Study shown that variants of Covid-19 virus is significantly connected with headache symptoms. Patients with beta strain are more commonly presented with headache.

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Acute Fatal Liver Failure in a Patient Without Preexisting Liver Disease: Case Report

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Background: Early reports on SARS-CoV2 suggested dominantly respiratory tissue involvement in the pathogenesis of COVID-19 infection. Recently, emerging evidence suggests that COVID-19 causes systemic organ dysfunction.

Case report: We reported a case of an older female patient who developed severe acute liver failure without preexisting chronic liver disease, further complicated by multiorgan failure. The patient was first hospitalized for having a moderate COVID-19 infection, needing mild supplemental oxygen support. Her comorbidities included hypertension and type 2 diabetes. She was treated according to the National COVID-19 protocol and, after achieving satisfactory treatment response, she was discharged. Two days later, she was readmitted for jaundice, fatigue, and abdomen swelling. On physical examination, clinical signs of ascites were noted. Her laboratory analysis revealed highly elevated liver enzymes (> 3000 U/L), high deRitis, and ALT/LDH ratio, suggesting dominant hepatocellular injury. Synthetic liver function was compromised with present coagulopathy (low platelets and prolonged PT/INR), hyperbilirubinemia, and low albumins. Abdomen ultrasound was positive for ascites and excluded other causes of liver injury. No clinical signs of encephalopathy were observed, with ammonia level being in reference range. The patient's state further deteriorated and she developed acute kidney failure and generalized oedema. During the entire hospitalization, she had no clinical signs of pneumonia or respiratory compromise. Even so, unfortunately, due to the fulminant liver failure with subsequent multiorgan dysfunction, desperate rescue efforts, the patient eventually died.

Conclusion: Varying clinical presentation and hepatotropism of SARS-CoV2 virus infection needs further investigation in order to mitigate COVID-19 clinical course and outcome.

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Hyponatremia Severity Affects Patient Outcome in COVID-19

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Background: Hyponatremia is the most common electrolyte imbalance in hospitalized patients. Our aim was to assess the impact of severity of hyponatremia on COVID-19 severity and its outcome.

Methods: This retrospective study included 102 patients treated from March until July 2021. Based on sodium levels at admission, patients were divided into four groups (eunatremia (euNa), mild (mild hypoNa), moderate (mod hypoNa) and severe hyponatremia (sev hypoNa). Assessed data included: demographic, anthropometric parameters, comorbidities, vital parameters, biochemical analyzes and pro-inflammatory markers. Disease severity was assessed using qSOFA score. Patient outcome was regarded as discharged patients, patients requiring noninvasive ventilation (NIV) and patients transferred to the ICU.

Results: Out of 102 patients, 48% were euNa, 34% had mild hypoNa, 10% had mod hypoNa and 8% had sev hypoNa at admission. At the data cutoff, 72% patients were discharged, 19% required NIV and 9% were transferred to ICU. Mortality rate was 12%. Patients with sev hypoNa had significantly higher levels of IL-6 ($p=0.03$), CRP ($p<0.05$), procalcitonin ($p<0.005$), systolic blood pressure ($p<0.05$), higher respiratory rate ($p=0.032$) and higher mean oxygen flow rate ($p<0.001$) in comparison to euNa. qSOFA score was significantly higher among patients with sev hypoNa as opposed to patients with mild- and euNa ($p<0.05$). Multiple regression analysis showed that sev hypoNa is a statistically independent risk factor for in-hospital mortality ($p<0.05$).

Conclusion: Hyponatremia is a strong predictor of poor clinical outcome in COVID-19 infection, thus should be taken into consideration in order to achieve better results and treatment outcome.

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Gender Relativity Difference in COVID-19 Patients in Hospital Mortality and Clinical Course

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Introduction: Coronavirus Disease (COVID-19) rapidly spread all round the world and affect both gender.

Aim: To analyze the clinical characteristics and in-hospital mortality in male and female patients with COVID-19 pneumonia.

Methods: We analyzed a group of 214 patients with COVID-19 pneumonia, younger than 60 years, hospitalized from October 1, 2021 to November 30, 2021. in COVID Hospital Batajnica, Belgrade. COVID 19 pneumonia was confirmed and assessed severity by CT chest imaging with or without pulmonary angiography.

Results: In our study men were more represented than women (72.43% vs 27.57%). Median age was similar in both groups (m vs f=50.55 vs 50.50 years). In male patients arterial hypertension (29.5% vs. 17.3% $p=0.16$), diabetes melitus (31% vs. 25%, $p=0.37$); previous cardiovascular events (13.8% vs 7.7% $p=0.173$) were more often present. The moderate CT severity scores (7/25-17/25), was found in one half patients f 54.5% vs. m 56.9%, $p=0.37$. Although incidence of the pulmonary thromboembolism, the need for invasive mechanical ventilation were equally represented in both gender, the length of hospitalization was shorter in female patients (12 vs 15 days, $p=0.02$). In-hospital mortality rate was similar between gender.

Conclusion: There is no gender-related difference in COVID-19 patients younger than 60 years, regardless man has had more comorbidity and more complex clinical courses.

Key words: Covid-19, male, female, CT score, hospital days

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Analysis of Clinical Characteristics of Patients Treated for COVID-19 who Developed Severe Hemorrhagic Complication

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Introduction: The attention of the professional public is focused on the significant problem of frequent thromboembolic complications in patients with COVID-19 infection, while less attention is paid to the analysis of patients with hemorrhagic complications.

Objective: to analyze the main clinical characteristics of patients treated for COVID infection who have experienced massive bleeding (retroperitoneal hematoma).

Material and methods: patients treated for COVID 19 pneumonia, and in whom massive bleeding (retroperitoneal hematoma) occurred, were consecutively collected.

Results: We analyzed data from a total of 18 patients, with COVID 19 pneumonia, mean age 71.1 ± 12.9 years, who were diagnosed with retroperitoneal hematoma during hospitalization as a severe hemorrhagic complication who had to undergo surgery. All patients had a radiographically confirmed clinical picture of pneumonia with an average oxygen saturation of room air of $84.6 \pm 2.3\%$, and during hospitalization were treated with prophylactic doses of low molecular weight heparin. Our group is consist of 10 male patients (57.8%) and 8 female patients (42.2%). The previous diagnosis of hypertension (92.3%), as well as renal insufficiency with average creatinine values 202.5 ± 540.1 $\mu\text{mol/l}$ look like as important risk factors for the development of retroperitoneal hematoma.

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Conclusion: Elderly patients with previously established hypertension and renal insufficiency represent a particularly vulnerable group for the development of retroperitoneal hematoma and life-threatening hemorrhagic complications. Defining risk groups for hemorrhagic complications, their timely recognition and treatment, as well as further work on the analysis of this group of patients is an unavoidable task in the treatment of patients with COVID-19 infection.

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2

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